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PERFORMANCE MANAGEMENT THROUGH INNOVATION CAPABILITY IN SMES

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ABSTRACT

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Small and medium-sized enterprises (SMEs) are assuredly important to maintain strong economic growth. How to manage and maintain SMEs' performance is a sizable challenge, and requires an understanding of the drivers of performance. Innovation capability has been suggested to be one of these key drivers. In order to manage innovation capability–performance relationship, it has to be measured. SMEs may have distinct characteristics that separate them being just smaller versions of large firms. Performance measurement and management of innovation capability is challenging, because SMEs usually have some drawbacks compared to large firms. Thus, it is unclear whether theories developed to understand large firms apply to SMEs.

This research contributes to the existing discussion on performance management through innovation capability in the SME context. First, it aims at increasing understanding of the role of innovation capability in performance management. Second, it aims at clarifying the role of performance measurement in developing innovation capability. Thus, the main objective of the research is to study how to manage performance through measuring and managing innovation capability.

The thesis is based on five research articles that follow a positivist approach. From a methodological point of view, quantitative and complementing conceptual methods of data collection are utilized.

This research indicates that the performance management and measurement play a significant role in innovation capability in SMEs. This research makes three main contributions. First, it gives empirical evidence on the connection between innovation capability and SME

performance. Second, it illustrates the connection between performance measurement and innovation capability. Thirdly, it clarifies how to measure the relationship between innovation capability and performance.

Keywords: performance management, performance measurement, performance, innovation capability, SME

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Lahti, June 2014

Minna Saunila

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LIST OF PUBLICATIONS

This thesis consists of two main parts: the introductory section (Part I) and the publications (Part II). The publications comprising the second part are listed below, summarizing the contribution of the author of this thesis.

I Saunila, M., Ukko, J. and Rantanen, H. (2012) Innovation capability and its measurement in Finnish SMEs. In Melkas, H. and Harmaakorpi, V. (Eds.). "Practice-based innovation: Insights, applications and policy implications", Berlin/Heidelberg: Springer-Verlag, 417-435.

The author was responsible for research planning and design, as well as data analysis. The author conducted the literature review. Lead author and wrote most of the paper.

II Saunila, M. The role of innovation capability in achieving higher performance. Submitted (2014) to Innovation: Management, Policy & Practice.

The author is the sole author.

III Saunila, M. and Ukko, J. (2013) Facilitating innovation capability through performance measurement: A study of Finnish SMEs, Management Research Review, 36 (10): 991-1010.

The author was responsible for research planning and design, as well as data analysis. The author conducted the literature review. Lead author and wrote most of the paper.

IV Saunila, M., Pekkola, S. and Ukko, J. (2014) The relationship between innovation capability and performance: the moderating effect of measurement, International Journal of Productivity and Performance Management, 63 (2): 234-249.

The author was responsible for research planning and design, as well as data analysis. The author conducted the literature review. Lead author and wrote most of the paper.

V Saunila, M. and Ukko, J. (2012) A conceptual framework for the measurement of innovation capability and its effects, Baltic Journal of Management, 7 (4) 355-375.

The author was responsible for research planning and design. The author conducted the literature review and most of the analysis. Lead author and wrote most of the paper.

PART I: INTRODUCTORY SECTION

1 INTRODUCTION

1.1 Research background and motivation

Small and medium-sized enterprises (SMEs) are assuredly important to maintain strong economic growth, but how to sustain their performance in the long term is a sizable challenge (Ates et al., 2013). It has been suggested that firms that perform better today are more likely to perform better tomorrow. The main explanation for this feature of firm behavior is the different capabilities of firms to generate and implement new knowledge that determines their relative position in the industry (Hashi and Stojcic, 2013). SMEs tend to dedicate most of their attention to operational and technological aspects, which may result neglecting organizational and managerial problems and capabilities. However, a lack of organizational capabilities has been found to be one of the main factors limiting development in SMEs (Garengo and Bernardi, 2007).

A body of research has studied how firms attain performance better than their competitors with similar resources by exploiting their high-level capabilities (Ngo and O'Cass, 2013). When driving performance, the organizational capabilities used to deploy resources may be more important than the actual resource levels (Vorhies et al., 2009). At least according to Ketchen et al. (2007), resources have only potential value, and the capabilities developed and utilized by firms are what capitalize on the resources and result in superior firm performance. Innovation has been highlighted as being one of the most important organizational capabilities, because, firms need innovation to improve their performance in real-life changing business environments (Aragón-Correa et al., 2007).

This trend has also been seen in the performance management field, where innovation has been considered as one of the main business processes of an organization (Kaplan and Atkinson, 1998). Although it has long been acknowledged that continuous improvement in processes and product capabilities is critical for long-term success (Kaplan and Norton, 1996), the role of innovation in performance management has not increased until recently. Today, new concepts and frameworks are extending performance management to provide information on innovation opportunities and specific industries. Performance management models are also extending their scope beyond traditional functions such as finance and manufacturing to go deep into functions such as marketing and sales and R&D where intangibles play more of a role (Davila, 2012).

SMEs will play an important role in innovation in the future (Bititci et al., 2012). The importance of a better understanding of performance as a process is that it shapes the way in which we manage and sustain it (Ates et al., 2013); this applies also in the role of innovation as a driver of SME performance. This is because the key reason for innovation is the desire of firms to obtain increased business performance and increased competitiveness (Gunday et al., 2011). However, SMEs may have distinct characteristics that separate them from being just smaller versions of large firms. SMEs differ from larger firms by governance structure, meaning, for example, personalized management with little devolution of authority. They have resource limitations in terms of human capital as well as finance, and are usually dependent on a small number of customers and operate in limited markets (Hudson et al., 2001; Hausman, 2005). On the other hand, they also may have flat and flexible structures, high innovatory potential, reactive mentality, and informal, dynamic strategies (Hudson et al., 2001). Tangible products will be more readily adopted in SMEs than intangible ideas and management practices. Thus, it is unclear whether theories developed to understand large firms apply to SMEs (Hausman, 2005).

1.2 Research problem and objectives

An increasing emphasis on SMEs as future economic engines directly relates to performance management in SMEs' theme as well as impacting on themes such as inter-organizational performance, performance measurement for innovation, and performance measurement as a social system (Bititci et al., 2012). Although of growing interest and importance, there is still relatively little research on performance management and measurement in SMEs (Garengo et al., 2005; Brem et al., 2008). The current state of knowledge with respect to performance management and measurement in SMEs seems to be also limited to the study of SMEs from more traditional performance measurement perspectives (Bititci et al., 2012).

Especially research related to performance management and measurement of innovation remains limited. Despite the number of studies concerning the drivers and outcomes of innovation, research that encompasses all the relevant constructs in an integrated manner remains rather limited (Rhee et al., 2010). Most of these studies are conceptual in nature and/or focus only on a single type of innovation rather than considering innovation in its widest sense, and then explore its effect on performance (Gunday et al., 2011). Understanding how innovation delivers firm performance is paramount to managing firm innovation. A possible way to advance this research is to test the connection between identified innovation determinants and firm performance (Crossan and Apaydin, 2010).

Also, further work is needed on the effects that performance measurement has on innovation (c.f., Marginson, 2002; Franco-Santos et al., 2012). There seems to be little agreement about what should be measured and how. There is no real consensus about how performance measurement might inform action to improve performance, which is a result of the lack of sound models of innovation (Birchall et al., 2011). From the relatively small number of empirical studies of innovation, performance measurement appears to be undertaken infrequently, in an ad hoc fashion, and relies on dated, unbalanced, or under-specified models of innovation (Adams et al., 2006). There are no cross-disciplinary studies that connect the fields of performance management and innovation management to increase understanding of this issue. Activities that firms should do to manage performance—developing employees, coordinating operations, developing and measuring financial and non-financial performance, personnel appraisals, developing and implementing strategy, providing feedback, change, resource allocation, coaching, action planning, communication, and motivation (Bititci et al., 2011; Ates et al., 2013)—also affect innovation. The two fields should thus be more connected.

The current research contributes to the existing discussion on performance management through innovation capability in the context of SMEs. First, the current research attempts to make the concept of innovation in the SME context more explicit by utilizing and refining the concept of innovation capability. The second phase is to operationalize and empirically test the effect of SME innovation capability on performance, with a view to enhancing the performance management literature on insights of innovation and innovation capability. Thus, these two phases aim at increasing understanding of the role of innovation capability in performance management. Third, this study attempts to improve the precision of innovation performance measurement through expanding and refining its existing performance measurement guidelines and principles. This final phase aims at clarifying the role of performance measurement in developing innovation capability. Thus, the main objective of the research is to study *how to manage performance through measuring and managing innovation capability*. To reach the objective, two main research questions and their sub-questions are addressed. The research questions are as follows.

1. Does SME innovation capability affect performance?

a) Which determinants form innovation capability of SMEs?

b) What are the effects of innovation capability on performance in SMEs?

2. How does performance measurement promote the relationship between innovation capability and performance in SMEs?

a) *What are the effects of performance measurement on innovation capability of SMEs?*
b) *How can the relationship between innovation capability and performance be measured?*

1.3 Scope of the research and definition of key concepts

1.3.1 Scope of the research

The scope of this research is derived from two fields of literature: performance management and innovation management, which are both a part of the management research field. There are many streams in innovation management research (c.f., open innovation, practice-based innovation, and employee-driven innovation). In this research, the approach is crosscutting, because no single research stream is adopted. Rather, the focus is to investigate innovation as a phenomenon, not through any specific research field. The literature streams are combined so that the ideas and mechanisms introduced in the literature on innovation management are applied to performance management to observe the issues that affect the performance of SMEs. Thus, the research seeks to connect innovation management research with performance management research and deepen their integration, while mainly contributing to the performance management literature. The scope is illustrated in Figure 1. The main contribution of the current research is located in the field of performance management.

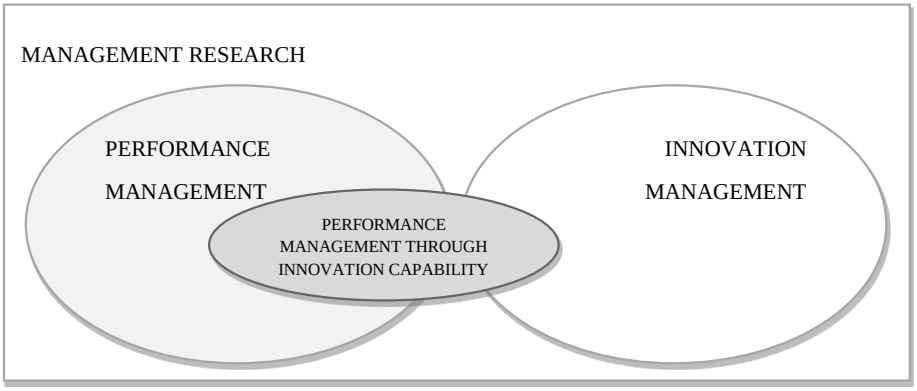

Figure 1. Scope of the research

Performance management is a multidisciplinary field. Management research in areas as diverse as human resource management, manufacturing and operations management, business

strategy, marketing, accounting, organizational behavior, industrial economics, psychology, political science, and operational research is contributing to the field of performance management (Neely, 1999; Franco-Santos et al., 2007; Richard et al., 2009; Franco-Santos et al., 2012). For example, research on human resources considers performance management as a way of managing people, whereas operations management emphasizes the role of performance measurement in the process, stressing that all activities are important in developing performance. In strategic management, the importance of performance management lies in the formulation of firm objectives and translating them into action. Quality focused research highlights the improvements of processes and performance (Ates et al., 2013). Although the use of different perspectives, theories, and paradigms has contributed to the development of the field, the lack of cross-disciplinary studies has also helped to determine its fragmentation (Micheli and Manzoni, 2010).

Studies on innovation in the field of performance management are still rare. Innovation management literature has some studies that investigate the relationship between innovation and performance (c.f., Subramanian and Nilakanta, 1996; Lloréns Montes et al., 2005; Mazzanti et al., 2006; Martínez-Román et al., 2011; Hashi and Stojcic, 2013), but only a few studies have investigated the relationship in the performance management field (Oke et al., 2007; Gunday et al., 2011; Tomlinson and Fai, 2013). This is studied in this research, but departs from previous studies by concentrating the effects of innovation capability in the context of SMEs.

In addition, performance management researchers have studied the effects of performance measurement and management in different contexts (Bititci et al., 2006; Pavlov and Bourne, 2011; de Waal and Kourtit, 2013). However, there are few examples of research concentrating on using performance measurement and management in innovation (c.f., Janssen et al., 2011; Schentler et al., 2010), and the research is in its early development, although it has gained more interest recently. This current research continues the research related to this area of performance management of innovation by investigating the effects of performance measurement on innovation capability in the context of SMEs.

1.3.2 Concepts related to innovation

Innovation

Innovation has been conceptualized in a variety of ways in the literature. The definitions can be divided into two categories: those pertaining to innovation as a process and those relating

to innovation as an outcome (Crossan and Apaydin, 2010; Jiménez-Jiménez and Sanz-Valle, 2011).

There are various definitions of innovation as a process. Wan et al. (2005, p. 262) have defined innovation as "a process that involves generation, adoption and implementation of new ideas or practices within the organization." Tidd et al. (2005, p. 66) consider innovation as "a process of turning opportunity into new ideas and of putting these ideas into widely used practice."

The conceptualizations that consider innovation as a process have some common dimensions. Crossan and Apaydin (2010) define the dimensions as follows: driver, source, locus, view, and level. Dimensions pertaining to innovation as a process should answer the question 'how.' Driver and source of innovation can be either internal or external. An internal driver of the innovation can be available knowledge and resources, whereas an external driver would be a market opportunity or imposed regulations. An internal source of innovation is ideation, whereas an external source of innovation is adoption of innovation invented elsewhere. The locus dimension is present if innovation is a closed process or open process. The view dimension considers how the innovation process starts and develops—whether it is top-down or bottom-up. The level dimension delineates the split between individual, group, and firm processes (Crossan and Apaydin, 2010).

Also, a variety of divisions of innovation outcomes have been presented. For example, Schumpeter's (1934, p. 66) innovation concept covers five areas: (i) the introduction of a new good or a new quality of a good (product innovation); (ii) the introduction of a new method of production, including a new way of handling a commodity commercially (process innovation); (iii) the opening of a new market (market innovation); (iv) the conquest of a new source of supply of raw material or intermediate input (input innovation); and (v) the carrying out of a new organization of industry (organizational innovation). Damanpour (1991) presented the following innovation types: innovation can be radical, incremental, product, process, administrative, or technical.

Innovation, when referred to as an outcome can also be divided into several dimensions, which include referent, form, magnitude, type, and nature (Crossan and Apaydin, 2010). Dimensions pertaining to innovation as an outcome should answer the questions 'what' or 'what kind.' The referent dimension defines the newness of innovation as an outcome; it can be new to the firm, to the market it serves, or to the industry. Scholars differentiate three forms of innovation: product or service innovation, process innovation, and business model

innovation. The magnitude dimension indicates the degree of newness of the innovation outcome, usually distinguished between incremental and radical innovation. In terms of type, division can be made between technical and administrative innovations. Finally, nature (tacit or explicit) can be applied to both innovation as a process and innovation as an outcome. While innovation as a product is largely tacit, innovation in a service or process may remain unarticulated (Crossan and Apaydin, 2010).

The distinction between innovation as a process and as an outcome is sometimes blurred (Crossan and Apaydin, 2010). Thus, in this research two definitions of innovation are drawn together. Wan et al. (2005) defined innovation as a process that involves generation, adoption, and implementation of new ideas or practices within the organization. Damanpour (1991) utilized a theoretical base where innovation is the adoption of an idea or behavior new to the adopting entity, which involves all dimensions of firm activities, such as a new product or service, a new production process technology, a new structure or administrative system, and a new plan or program within the firm. By drawing these two definitions together, *innovation* in the context of this research work can be thought of in its broadest sense, considering innovation as a process and outcome.

Innovation capability

The organizational capability view of innovation holds that firms do not merely compete with new products or services, but rather with their own unique capabilities underlying their product market activities (Liao et al., 2009). Compared to resources, routines and capabilities are embedded in the dynamic interaction of multiple knowledge sources and are more firm specific and less transferable, thus leading to competitiveness (Peng et al., 2008). A capability can be defined as "the proficiency of a bundle of interrelated routines within firms for performing specific tasks" (Ngo and O'Cass, 2013, p. 1135). Capabilities do not reside in individual routines but emerge from the integration of multiple interrelated routines and processes. This implies that capabilities are built through managerial choices in identifying, developing, and integrating routines and processes to undertake specific functionally oriented behaviors (Ngo and O'Cass, 2013). Capabilities require that multiple characteristics be already embedded in a firm (Grant, 1997).

Lawson and Samson (2001, p. 384) define innovation capability as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders." Hogan et al. (2011, p. 1266) define innovation capability as "a firm's ability, relative to its competitors, to apply the collective knowledge,

skills, and resources to innovation activities related to new products, processes, services, or management, marketing or work organization systems, in order to create added value for the firm or its stakeholders." According to Bullinger et al. (2007), innovation capability is a holistic, corporate-wide potential of a firm to generate new and unique values. Innovation capability relates to a variety of areas and is influenced by different factors inside and outside the organization. Similarly, Ngo and O'Cass (2013) conclude that innovation capability is embedded within the application of knowledge and skills embedded within the routines and processes of the firm to perform innovation pertaining to technical innovations (develop new services, service operations, and technology) and non-technical innovations (managerial, market, and marketing).

Also in this present research, a broader conceptualization of innovation capability is adopted. Thus, innovation capability may relate to creating a new product or service, a new production process technology, a new structure or administrative system, or a new plan or program. This study adopts the view of Ngo and O'Cass (2013) that suggests that innovation capability is manifested in innovation-related business processes (technical and non-technical), is something beyond resources, and is a valuable input for firms to develop and maintain competitiveness. On the basis of earlier definitions of Bullinger et al. (2007) and Ngo and O'Cass (2013), *innovation capability* is defined in this study as organizational routines and processes affecting an organization's ability to perform innovation. It consists of determinants that influence an organization's ability to perform innovation, and innovation capability is thus a predictor of innovation, both process and outcome.

1.3.3 Concepts related to performance and measurement

Performance

According to Tangen (2005), performance can be described as an umbrella term for all concepts that consider the success of a firm and its activities. Performance can refer to actual results/outputs of certain activities, how an activity is carried out, or an ability to achieve results (Lönnqvist, 2004). Atkinson (2012) defined performance as the achievement of results ensuring the delivery of desirable outcomes for a firm's stakeholders. According to Fitzgerald et al. (1991), there are two basic types of performance measurement in any organization: those that are related to results (competitiveness, financial performance), and those that focus on the determinants of the results (quality, flexibility, resource utilization) (Neely et al., 2000).

In this research, *performance* refers to results. Both innovation and innovation capability are defined as antecedents of performance. A firm's performance is divided into two main areas: operational performance and financial performance. Financial performance is related to the actual results (profitability, etc.) and operational performance to the determinants of the results (productivity, quality, etc.).

Performance measurement

Performance measurement can be defined as "the process of quantifying the efficiency and effectiveness of action" (Neely et al., 1995, p. 80). Many other scholars have also considered performance measurement as a process (c.f., Lönnqvist, 2004; Radnor and Barnes, 2007). According to Lönnqvist (2004), performance measurement is a process used to determine the status of an attribute or attributes of the measurement objects. Radnor and Barnes (2007) state that performance measurement can be defined by quantifying the input, output, or level of activity of an event or process. Atkinson (2012) suggested that performance measurement may also be understood as the regular collection and reporting of data to track work produced and results achieved.

In this research, the definition of Neely et al. (1995) is adopted. *Performance measurement* is the process of quantifying the efficiency and effectiveness of action. The term performance measurement can cover both the quantitative and assessment-based aspects of the action. Innovation measurement refers to the process that deals with quantifying the efficiency of exploiting innovation capability, whereas innovation performance measurement also the effectiveness of exploiting innovation capability. Thus, innovation performance measurement is used rather than innovation measurement to highlight the wider scope of the process. In the context of this research, the process, *innovation performance measurement*, deals with quantifying the efficiency and effectiveness of exploiting innovation capability.

Performance measure

Performance measurement is conducted via performance measures. Performance measure is used for diagnosing the status of a measurement object (Lönnqvist, 2006). Neely et al. (1995, p. 80) defined performance measure as "a metric used to quantify the efficiency and/or effectiveness of action." This can be expressed either in terms of the actual efficiency and/or effectiveness of an action, or in terms of the end result of that action. In this research, the definition of Neely et al. (1995) is adopted. In the context of this research, *innovation*

*measure*s deal with quantifying the efficiency and effectiveness of exploiting innovation capability.

Performance management

According to Bititci et al. (1997) performance management can be considered as a process by which the firm manages its performance in line with its corporate and functional strategies and objectives. Performance management is a philosophy which is supported by performance measurement. Performance management precedes and follows performance measurement, in a virtuous spiral, and performance management creates the context for performance measurement (Lebas, 1995). Performance management is thus an action based on performance measurement, which results in improvements in behavior, motivation, and processes (Radnor and Barnes, 2007). Further, Radnor and Barnes (2007) consider that performance measurement is about efficiency, productivity, and utilization, whereas performance management builds on performance measurement and is concerned with effectiveness and a broader, more holistic, even qualitative view of operations and the organization. Atkinson (2012) concludes that performance management is about what you do with the information developed from measuring performance. It means using performance measurement information to focus on what is important, to manage the organization more effectively and efficiently, and to promote continuous improvement and learning. Ates et al. (2013) described performance management as an iterative closed-loop process aimed to manage and improve individual and corporate performance through continuous adaptation to the changing operating environment.

This research follows the definition of Radnor and Barnes (2007). *Performance management* is action based on performance measurement, which results in improvements in behavior, motivation, and processes. In the context of this research, performance management focuses on action based on performance measurement of innovation capability.

Performance management through innovation capability

Combining the definitions of performance management and innovation presented above, *performance management through innovation capability* is defined as using appropriate performance management principles and performance measures to enhance the effect of the firm's innovation capability on firm performance. Thus, it can be considered as actions by which the firm manages its performance based on innovation capability and its performance measurement.

1.4 Structure of the thesis

The thesis consists of two sections: an introductory section and a section containing five scientific publications. In the introductory section, an overview of the study is presented. First, the background, motivation, research objectives, scope, key concepts, and the structure of the thesis are presented. Second, relevant literature and research methodology in regards to the current research are discussed. At the end of the introductory section, the results and conclusions from the publications are summarized.

The results and conclusions of this thesis are based on the findings of the five publications at the end of the thesis. The publications include data from two separate studies. The two sub-studies are presented in order, based on their content, and they can be seen as a further study to each other. The first sub-study utilizes quantitative data collected by a structured survey, whereas the second is a conceptual literature review study. The research publications form an entity that enables the author to answer the four research questions of this thesis. The relationships between the research questions and publications are presented in Figure 2.

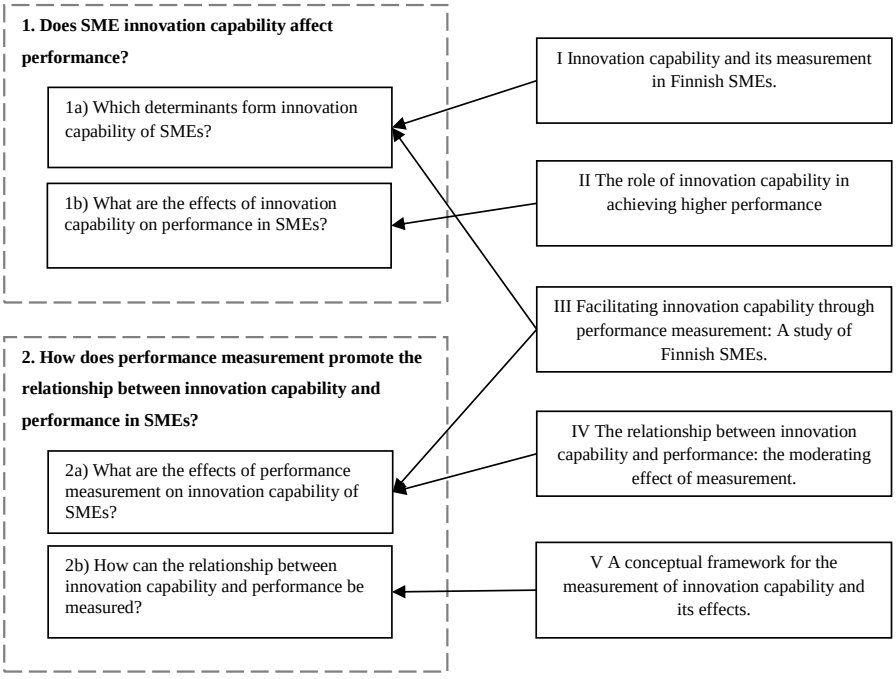

Figure 2. Relationships between the research questions and publications

2 THEORETICAL BACKGROUND

This chapter presents performance measurement and management through innovation capability as the theoretical ground for the research. The chapter begins with a description of the nature of innovation capability in SMEs. The chapter continues with a review of the connection between innovation and performance. Next, a brief introduction of performance measurement and management in SMEs is presented with a description of the uses and effects of performance measurement. Also, principles of innovation performance measurement are presented. Finally, the chapter presents the conceptual framework of the research based on this review of prior literature.

2.1 Innovation capability as a driver of SME performance

2.1.1 Innovation capability of SMEs

SMEs are fundamentally different from large firms in innovation (Garengo et al., 2005). Innovation is a sound antecedent of performance (Rhee et al., 2010), but SMEs usually have some drawbacks regarding innovation compared to large firms. These include, for example, customer dependency and lack of resources such as knowledge, skills, training, networking, and finances (Laforet and Tann, 2006; Rhee et al., 2010). Despite these constraints, SMEs usually have a high innovatory potential (Hudson et al., 2001), because they seek to secure success with their core assets such as innovative technology. Thus, the proclivity of innovation as a critical source of competitiveness may be even greater in small firms than larger firms (Rhee et al., 2010.) Whereas the strengths of large firms lie mostly in resources and is predominantly material (e.g., economies of scale and scope, financial and technological resources), the strengths of SMEs are in the form of behavioral characteristics (e.g. entrepreneurial dynamism, flexibility, efficiency, proximity to the market, motivation) (García-Morales et al., 2007).

On the other hand, SMEs have advantages over large firms such as being close to customers and having a flexible and informal environment (Laforet and Tann, 2006). This flexibility may cause SMEs to be even more innovative and improve performance more by adapting to market changes and improving and having shorter and faster decision chains. SMEs have a greater capacity for customization and are capable of learning quickly and adapting routines to improve performance (García-Morales et al., 2007). Additionally, they often have the courage to take risks and are prepared to try new ways of working (Laforet and Tann, 2006).

SMEs have a greater focus on incremental innovation than on radical innovation (Oke et al., 2007; Forsman and Rantanen, 2011). Laforet and Tann (2006) found that SME innovation mostly consists of developing new ways of working and incremental product innovations. According to Forsman and Rantanen (2011), incremental innovation in SMEs concern all innovation types: products, services, processes, production methods, and modes of actions, whereas radical innovation usually refers to products, services, and modes of actions. Huge resources may not be enough (or even may not be needed) to achieve innovation in SMEs. Innovation is not directly available to all organizations at all times, rather only to firms with the appropriate internal characteristics (Aragón-Correa et al., 2007). In order to achieve the benefits of innovation, resources need to be dedicated to the innovation task (Rosenbusch et al., 2011), but also the routines and processes, which determine the state of innovation capability, need to be in order. Innovation capability itself is not thus a separately identifiable construct. The capability is composed of reinforcing routines and processes within the firm. These processes are a key mechanism for stimulating, measuring, and reinforcing innovation (Lawson and Samson, 2001). As shown by the study done by Aragón-Correa et al. (2007), innovation is based on multiple and simultaneous influences of individual and collective determinants. These determinants are introduced next.

First, culture and leadership are one of the relevant internal conditions of innovation in SMEs (c.f., Zhu et al., 2005; Laforet and Tann, 2006; Aragón-Correa et al., 2007). According to Smith et al. (2008), culture relates to the values and beliefs of the organization and how these affect the ability to manage innovation. Culture has to do with the way people handle failure, the motivation from a leadership supporting innovation, the willingness to exchange knowledge, and the targeted promotion of innovators within the firm (Bullinger et al., 2007). The ability to lead, direct, and support the creation and sustaining of innovation behaviors is important for a firm (Bessant, 2003). The importance of leadership style lies in the opportunities of the leader to directly decide to introduce new ideas into an organization, set specific goals, and encourage innovation initiatives from employees (Harbone and Johne, 2003; Aragón-Correa et al., 2007). Regarding SME innovation, it is important for the managers to share power and control and be willing to manage conflict with individuals over change, although it may be at odds with his/her career experience where power normally comes with the hierarchical level (Harbone and Johne, 2003; Hausman, 2005; Kallio et al., 2012). Managers should also invest time in increasing the personnel's opportunities to participate in development activities (Lampikoski and Emden, 1999), as well as strike a balance that allows employees to act on good ideas (Dobni, 2008). This is because leadership that fosters innovation enables setting task boundaries, sharing information, obtaining

resources, instilling a positive attitude, and a leadership style that keeps the employees challenged and focused (McDonough, 2000).

Second, in addition to its culture, the firm's capability to innovate is dependent on its internal processes (c.f., Neely et al., 2001; Akman and Yilmaz, 2008; Hashi and Stojcic, 2013). According to Globe et al. (1973), it is critical for SMEs to keep the period between first idea and implementation as short as possible, because this efficient process that enables the firm to manage the ambiguity of the innovation is critical to innovation (Bullinger et al., 2007). The structure of a firm oriented towards innovation differs from other firms regarding decision-making processes and formalization. In such a dynamic context, SMEs face the challenge to find the right balance between control and flexibility and adaptability. After all, there are tasks that need to be clearly managed and controlled (Adams et al., 2006; Bullinger et al., 2007). This means providing sufficient freedom to allow the employees to explore creative possibilities, but retaining sufficient control to manage innovation in an effective and efficient fashion (Bullinger et al., 2007). According to Subramanian and Nilakanta (1996), decentralized and informal organizational structures facilitate innovation. They also propose that the flexibility and openness of structures help to encourage new idea generation. Reward systems are powerful motivators and foster creative behavior (Lawson and Samson, 2001). A supportive structure also plays an important role in improving communication in the organization (Dixit and Nanda, 2011).

Third, an appropriate work climate is crucial for innovation. Climate creates a specific mode of beliefs, attitudes, and behaviors (Harbone and Johne, 2003). Van Hemert et al. (2013) showed that openness towards knowledge sharing is important in reinforcing innovation, especially in SMEs that might lack sufficient financial and human resources to solely rely on internal processes. In addition, mutual trust and respect create an atmosphere that encourages individuals to try new ideas without fear of failure and its consequences (Lampikoski and Emden, 1999; Wan et al., 2005). Innovation is more likely in a situation where people attribute high levels of integrity, competence, reliability, loyalty, and openness to others and view others as equals. Creating this environment involves having employees understand their roles, and then further developing their creative and independent sides (Dobni, 2008). According to Dobni (2008), this requires that the employees are treated equally.

Fourth, SMEs operate in a highly dynamic and rapidly changing environment (Hudson et al., 2001; Cocca and Alberti, 2010), where they need to regenerate in order to survive. Firms need to be tolerant of the mistakes that will occur and allow for recovery and learning from failures (Wan et al., 2005; Lawson and Samson, 2001). Innovation capability requires a collaborative,

open culture and incentives that reward challenging current actions (Skarzynski and Gibson, 2008).

Fifth, current literature also suggests that the source of innovation resides in the creativity and innovation capability of employees (Hotho and Champion, 2011; Kallio et al., 2012). Wan et al. (2005) suggest that important issues for an employee to be innovative are the belief that innovation is important, willingness to take risks, and willingness to exchange ideas. People who have creativity and intrinsic motivation (as well as skills) for their work will be favorable for creating a work environment that supports the creation of innovations (Amabile, 1997). According to Calantone et al. (2002), for effective innovation established norms, practices, and beliefs may have to be challenged. So, as business realities change, the employees' behavior and actions need to adjust accordingly (Dobni, 2008).

Sixth, Romijn and Albaladejo (2002) have defined the internal and external factors that affect a firm's innovation capability. Internal factors include the knowledge and skills brought into the firm by the entrepreneurs and workforce, obtained through experience. Organizations with high levels of innovation include not only the key individuals but also the continuing and stretching of individual development (Tidd et al., 2005). Innovation is favored by training in terms of formal education and also developing know-how through learning on the job (Freel, 2005; Hausman, 2005; Martínez-Román et al., 2011), as it allows new knowledge to be shared and incorporated into the organization and helps individuals to learn and become more competent (Romero and Martínez-Román, 2012). García-Morales et al. (2007) conclude that firms with a high level of innovation have effective learning systems where human resources are developed and where firms learn to maintain competitiveness today while aggressively preparing for tomorrow.

Seventh, the internal characteristic that determines the state of innovation is the capability to understand the external environment (Neely et al., 2001; Akman and Yilmaz, 2008). Networks are important for SMEs, because interaction with suppliers, customers, industry associations, competitors, and the like can provide SMEs the missing external inputs that the firm itself cannot provide (c.f., Lawson and Samson, 2001; Romijn and Albaladejo, 2002; Hausman, 2005; Adams et al., 2006). According to Day and Schoemaker (2005), successful SMEs are more externally oriented and they actively scan general economic and business conditions, technological trends, and capabilities and regularly analyze their competitive position in the market. In addition, activities related to the systematic search for new markets and business opportunities, and participation in conferences or trade fairs can be renewing to SMEs (Guzmán and Santos, 2001). Through establishing networks, SMEs can overcome their

internal resource constraints and obtain the advantages often associated with larger size (Tomlinson and Fai, 2013).

Based on prior literature of innovation capability in SMEs, it can be stated that there is a wide range of determinants that affect an organization's ability to perform innovation, both with external and internal focus. Innovation capability may not be a homogenous collection of determinants, but different kinds of innovations (Francis and Bessant, 2005) and different kinds of firms (Silva et al., 2012; Kallio et al., 2012) may require utilizing and developing different determinants. These determinants include, for example, include leadership practices (cf., Bessant, 2003; Tidd et al., 2005; Smith et al., 2008; Kallio et al., 2012), employees' skills and innovation (cf., Smith et al., 2008; Kallio et al., 2012), processes and tools for managing ideas (cf., Lawson and Samson, 2001; Tidd et al., 2005; Skarzynski and Gibson, 2008; Smith et al., 2008), support culture (cf., Lawson and Samson, 2001; Tidd et al., 2005; Wan et al., 2005; Skarzynski and Gibson, 2008; Smith et al., 2008; Kallio et al., 2012), external sources for information (cf., Romijn and Albaladejo, 2002; Tidd et al., 2005; Kallio et al., 2012; Laforet, 2011), development of individual knowledge (cf., Bessant, 2003; Tidd et al., 2005), employees' welfare (cf., Laforet, 2011), and links to strategic goals (cf., Bessant, 2003; Smith et al., 2008). However, in the context of SMEs, these determinants have not been clearly defined.

2.1.2 Effect of innovation on performance

The majority of the previous research on the relationship between innovation and performance agrees that innovation influences performance positively (c.f., Aragón-Correa et al., 2007; García-Morales et al., 2007; Jiménez-Jiménez and Sanz-Valle, 2011; Hashi and Stojcic, 2013). Previously, the majority of studies used R&D expenditure as the principal innovation measure. However, R&D expenditure suffers from several shortcomings when used as an innovation measure. For example, the tendency towards the understatement of R&D in smaller firms limits the applicability of such a measure to capture the state of innovation. This has resulted in a new generation of research that studies the effect of innovation on firm performance by focusing on the complexities of innovation as a process and channels through which the inputs of innovation are transformed into better performance (Hashi and Stojcic, 2013). After all, from the perspective of its management, it is no longer sufficient to treat innovation as a linear process where resources are channeled at one end, from which emerges a new product or process (Adams et al., 2006).

As mentioned, many scholars have studied the relationship between innovation and performance (c.f., Calantone et al., 2002; Cainelli et al., 2004; Aragón-Correa et al., 2007; Rhee et al., 2010; Jiménez-Jiménez and Sanz-Valle, 2011) and found a positive relationship. The study by Calantone et al. (2002) reveals that innovation, measured by the rate of adoption of innovations by the firm and as the organization's willingness to change, is positively related to firm performance. Cainelli et al. (2004) found that innovation can explain a firm's performance. Firms with a high level of innovation have higher levels of productivity and economic growth than firms with a low level of innovation. The study by Rhee et al. (2010) concluded that innovation has a positive influence on performance. These results show that performance can be derived from the propensity for innovation. Jiménez-Jiménez and Sanz-Valle (2011) also found a positive and significant effect of innovation on performance, covering the number of innovations, the proactive or reactive character of those innovations, and the resources the firm invests in innovation.

Earlier studies have also suggested that innovation is an important determinant of individual performance constructs, such as profitability as well (c.f., Leiponen, 2000). It has been found that there exists a clear difference in profitability between firms with a high level of innovation and firms with a low level of innovation (Cefis and Ciccarelli, 2005). The findings of Pett and Wolff (2011) indicate that innovation is important for the profitability of return on assets. In the study by Subramanian and Nilakanta (1996), return on assets was used to measure profitability. It was found that the adoption of a large number of technical and administrative innovations leads to greater profitability. According to Cho and Pucik (2005), the effect of innovation on profitability is mediated by quality. They also suggest that innovation has a positive effect on profitability, partly because innovation affects quality, which in turn affects profitability.

In addition to overall performance and profitability, the effects of innovation on operational performance have been studied. Innovations themselves have an effect on operational performance with regard to productivity, lead times, quality, and flexibility (Armbruster et al., 2008). According to Hashi and Stojcic (2013), the firm's productivity increases significantly with output innovations. Innovation capability is also significantly related to volume flexibility, product mix flexibility, unit manufacturing cost, and speed of new product introduction. It is also marginally related to delivery performance (Peng et al., 2008).

When research has concentrated on specific innovation types, process and product innovations are the most common innovation types examined (Gunday et al., 2011). Akgün et al. (2009) concluded that both product and process innovation affect firm performance. The

study done by Ar and Baki (2011) confirmed that product and process innovation led to better performance, when measured by sales, profitability, and market share. The relationship was stronger with product innovation than process innovation.

Historically research on innovation types has followed a technological imperative (Damanpour et al., 2009). However, not only technical innovations but also organizational innovations, defined as the introduction of new organizational methods for business management in the workplace and/or in the relationship between firms and external agents, are essential conditions for improving performance and for increasing the firm's value (Lloréns Montes et al., 2005; Bowen et al. 2010; Camisón and Villar-López, 2014).

Bowen et al. (2010) examined the relationships between organizational innovation and performance, and suggested that innovation and performance are overall positively correlated. In addition, Mazzanti et al. (2006) found that a firm's performance and organizational innovations are strictly and positively related to each other. The study by Camisón and Villar-López (2014) demonstrates that both organizational and technological innovation positively affect performance. Thus, performance can be improved through both technical and administrative innovation, besides other factors (Lloréns Montes et al., 2005). Damanpour et al. (2009) have found that the combinative adoption of innovation types over time affects performance. It means that certain compositions of innovation types over time will lead to distinctive competencies that positively influence performance.

Only a few studies have investigated the relationship between innovation capability and performance in SMEs. It has been stated that SMEs with strong innovation capability will gain competitiveness against competitors, enabling them to achieve superior performance (c.f., Li and Mitchell, 2009; Rosenbusch et al., 2011; Sok et al., 2013). A significant and positive relationship between innovation and performance in SMEs has been discovered (c.f., García-Morales et al., 2007; Sok et al., 2013), and the study by Keskin (2006) demonstrated that innovation, meaning a willingness to try out new ideas, seek out new ways of doing things, being creative in methods of operation, and the rate of product introduction, has a positive effect on performance in SMEs. Rosenbusch et al. (2011) compared the strength of the effect of innovation orientation (meaning the tendency to engage and support innovation) on performance, with the effect of innovation as an outcome (e.g., patents, new products, or services) on performance. They found that SMEs benefit significantly more from innovation orientation than from just focusing on developing new innovation outcomes. Focusing on generating innovations is not enough, but SMEs should also develop, communicate, and embrace innovation orientation. There are both internal effects (e.g., the development of more

ambitious goals, the allocation of resources in areas where they create more value, an inspiring and challenging firm culture, organizational proactivity, risk-taking) and external effects (e.g., a positive perception by market participants leading to higher brand equity, obtaining better collaboration partners, and attracting highly skilled employees) of innovation orientation that benefit SMEs more than the positive effects innovation outcomes (Rosenbusch et al., 2011).

2.2 Performance measurement and management

2.2.1 Performance measurement and management in SMEs

Performance measurement and management are an important link in the control structure of organizations (Ferreira and Otley, 2009). Firms use performance measurement for various purposes. A typical performance measurement helps businesses in setting business goals periodically and then providing feedback to managers on progress towards those goals (Simons, 2000).

Franco-Santos et al. (2007, p. 797) identified five roles of performance measurement. The first, "measure performance," refers to monitoring progress and measuring/evaluating performance. "Strategy management" includes planning, strategy formulation, strategy implementation, and focusing attention on issues important to an organization. The third role, "communication," refers to internal and external communication, benchmarking, and compliance with regulations. "Influence behavior" is the role that encompasses rewarding or compensating behavior, managing relationships, and control. Finally, "learning and improvement" comprises feedback, double-loop learning, and performance improvement. Similarly, Henri (2006a, p. 80) classifies four types of performance measurement use: monitoring, attention focusing, strategic decision-making and legitimization. Performance measurement is used to provide feedback regarding expectations and to communicate with various stakeholders (monitoring). During the decision-making process, it is employed as a facilitator (strategic decision-making) and to justify decisions or actions (legitimization). In addition, top managers use performance measures to send signals throughout the firm (attention focusing).

Managing performance within the context of SMEs requires an understanding of SME characteristics that influence the design and implementation of performance measurement (Garengo et al., 2005; Ates et al., 2013). Garengo et al. (2005) identified two types of obstacles to introducing performance measurement in SMEs: 'exogenous' barriers, e.g., the

lack of financial and human resources, and 'endogenous' barriers, e.g., short-term strategic planning and the perception of performance measurement as a bureaucratic system that causes rigidity.

Scarcity of resources has been considered as one of the main problems and typical characteristic of SMEs (Singh et al., 2008). Limitation of resources can be in the form of human resources (both management and manpower), finances, time, and security (c.f., Hudson et al., 2001; Singh et al., 2008; Ates et al., 2013). This resource scarceness restricts SMEs' capability in external orientation (Ates et al., 2013). The effect of the financial resources needed to implement performance measurement is proportionally more onerous in SMEs than in large firms (Garengo et al., 2005). Lack of human resources also causes difficulties in performance measurement when the employees are involved in the activities of managing daily work and have no extra time for additional activities such as performance measurement (Garengo et al., 2005).

In addition to the limited skills among employees (Singh et al., 2008), also managers (who may also be the owners) often do not have enough managerial expertise, which can result in poor strategic business planning and human resource management (Pansiri and Temtime, 2008). SMEs may lack a managerial culture, and therefore managerial tools and techniques are perceived as being of little benefit to the firm (Garengo et al., 2005). This is related to the SME characteristic that the processes are not very structured. The flexible nature of SMEs results in they often adopt less structured systems and processes in decision-making and managing the whole business (Hudson et al., 2001; Ates et al., 2013).

SMEs are characterized by personalized management, with little devolution of authority (Hudson et al., 2001). Many SMEs are owner-managed with entrepreneurs acting as dominant leaders who set direction and run the business on the basis of their experience and common sense, which generally results in a command and control management style (Ates and Bititci, 2011). Thus, management practices are closely linked to the individual's skills and the characteristics of the entrepreneur, and emerge mostly in response to internal operational needs. Usually, managers hold multiple roles and are in charge of both operational and strategic functions (Ates et al., 2013).

Garengo et al. (2005) found that SMEs operate in highly competitive, turbulent, and uncertain markets. Usually, they do not have control or influence over the market and thus they need to adopt a reactive approach and adapt to market changes (Hudson, 2001). When SMEs behave in a reactive manner, the level of strategic planning is poor and there are no formalized

decision-making processes (Garengo et al., 2005; Garengo and Bernardi, 2007). The lack of explicit strategies and methodologies to support the control process promotes both a short-term orientation and a reactive approach to managing the firm's activities (Garengo et al., 2005). When this behavior is amplified by a lack of dedicated resources, SME managers struggle with multiple short-term and long-term priorities at the same time. Strategic management and long-term priorities may be forgotten when day-to-day operational issues and customer needs take hold (Ates et al., 2013).

In SMEs, knowledge is mainly gained through experience and is often absorbed by means of tacit learning (Ates et al., 2013). Sousa et al. (2006) found that the training of employees and difficulty in defining new performance measures were highlighted as the major obstacles to the adoption of new performance measures. Since knowledge is mainly tacit and context-specific, the information required to implement and use performance measurement is difficult to gather (Garengo et al., 2005). Bourne (2001) underlines that performance measurement can only be effectively implemented and used when the firm perceives its benefits. SMEs often do not understand the potential advantages of implementing performance measurement (Garengo et al., 2005). SMEs are not always capable of adopting new ways of action and new techniques. For example, lack of time, resources, and know-how are obstacles to developing their operations (c.f., Hannula and Rantanen, 2000).

Even though size represents a weakness, for example in terms of available resources and long-term planning, on the other hand it favors a flat organizational structure with a lack of bureaucracy, which results in flexibility, adaptability, and rapidity in responding to the changing environment (Garengo et al., 2005). For this reason, SMEs usually have a high potential for innovation and the ability to satisfy customers' emerging and evolving requirements. A structure with few management layers favors face-to-face relations, simplifying communication processes, and offering the manager high visibility of the processes and the opportunity to directly influence employees (Singh et al., 2008).

2.2.2 Effects of performance measurement

When utilizing performance measurement, some positive effects can be attained if the measurement has been conducted in a proper way. According to Bourne et al. (2003), performance measurement has an effect on the environment in which it operates. Starting to measure, deciding what to measure, how to measure, and what the targets will be are all acts that influence individuals and groups within the organization. Once performance measurement has started, the measurement will have consequences, as will the actions agreed

upon as a result of that measurement (Bourne et al., 2003). Based on prior research, the effects of performance measurement are very much dependent on the way it is designed, developed, and used, and how well it fits the context in which it operates (e.g., Otley, 1999; Neely, 2005; Henri, 2006b; Pavlov and Bourne, 2011).

According to Pavlov and Bourne (2011), the effects of performance measurement depend on the way it is used. Performance measurement can affect an organization's routines in three ways. Pavlov and Bourne (2011, p. 112) call them "the trigger effect of measurement, the guidance effect of measurement, and the intensification effect of measurement." First, when performance measurement is used in its feedback-generating function, the measures communicate the results of the past execution of the routine and indicate whether its performance is adequate to the demands of the environment. Second, when performance measurement is used in its feed-forward function, it can affect the direction of the change in organizational processes. Third, measuring performance forces the search for a match between the existing idea and expression of the routine, and stimulates the process of adjusting them in order to respond to the new demands of the environment. Henri (2006b) has found that the way, either interactively or diagnostically, performance measurement is used also affects the effects of performance measurement. The use of performance measurement has also an effect on how performance measurement affects performance (Bourne et al., 2005).

The effects of performance measurement have been studied by many researchers. Performance measurement can result in many advantages for organizations. De Waal and Kourtit (2013) identified four advantages of performance measurement: higher results orientation, better strategic clarity, high people quality, and high organizational quality. Martinez (2005) presented eight positive effects of performance measurement. It focuses people's attention on what is important to the firm, results in improvements in business, improves customer satisfaction, increases productivity, aligns operational performance with strategic objectives, improves people's satisfaction, aligns people's behaviors towards continuous improvement, and improves firm reputation. This stream of literature has suggested that performance measurement affects positively many organizational capabilities and processes. These positive effects are introduced next.

First, Franco-Santos et al. (2012) identified that many previous studies have found performance measurement has an effect on innovation and other organizational capabilities. Performance measurement influences the strategic capabilities of organizations (specific abilities, processes, or competences that help the firm gain competitiveness) through the

routines they stimulate. For example, Cruz et al. (2011) studied the effect of performance measurement on innovation, and found that reorganizing performance measurement fostered innovation (meaning new ideas, products, and ways of working). Performance measurement, when used interactively, can also enhance the development of new ideas and initiatives within a firm, and in that way affects innovation (Marginson, 2002). Bisbe and Otley (2004) found that the interactive use of performance measurement favors innovation only in firms with low levels of innovation, while in firms with high levels of innovation it has the opposite effect. Henri (2006b) showed that the interactive use of performance measurement fosters organizational capabilities in terms of innovation and organizational learning.

Second, performance measurement influences organizational routines and management practices by changing the way leaders behave (Franco-Santos et al., 2012). Performance measurement affects leadership and management by improving the quality and content of the conversations managers have with employees, bringing about new routines and enhancing information sharing (Ukko et al., 2007). According to studies by Bititci et al. (2006) and Henri (2006a), performance measurement is a powerful tool for bringing about change and new ways of managing people in organizations, but performance measurement is also subject to the effects that the organizational culture may have on them. A successfully implemented and used performance measurement through cultural change leads to a more participative and consultative management style. Similarly, the correct use of performance measurement can lead to an achievement culture (Bititci et al., 2004; Bititci et al., 2006).

Third, according to Tuomela (2005), performance measurement helps managers learn how to best improve their performance when appropriate feedback mechanisms are in place. It has been found that performance measurement influences managers' cognition and motivation (Hall, 2008) by being useful for self-monitoring their own performance and for making decisions (Wiersma, 2009). Performance measurement is indirectly associated with managerial performance through dimensions of role clarity and psychological empowerment. Performance measurement increases managers' perceptions of role clarity, because it provides managers with performance information that increases their knowledge of the organization's strategic goals and helps them to better understand the potential effects of their actions on the organization's value chain. Performance measurement influences managers' cognition and motivation, which, in turn, influence managerial performance (Hall, 2008).

Fourth, Franco-Santos et al. (2012) concluded that the information included in performance measurement is likely to increase the understanding of individuals regarding what is expected from them at work since performance measurement increases the employee's understanding

of the strategy, by translating this strategy in tangible performance measures at all organizational levels. This creates more insight into the goals to be achieved and their role in this (de Waal and Kourtit, 2013).

Fifth, performance measurement has been found to improve internal processes such as communication (c.f. Tuomela, 2005; de Waal and Kourtit, 2013), because it influences how people think, act, and interact (Franco-Santos et al., 2012). This can result in employees being more satisfied, the quality of the products and services provided by the organization increasing, and further contributing to a strengthened reputation of the firm as a quality organization (de Waal and Kourtit, 2013). Franco-Santos et al. (2012) emphasized the importance of generating a system supported by two-way communications to encourage knowledge sharing, generate trust, and avoid resistance. According to Franco-Santos et al. (2012), evidence from the literature shows that managers find performance measurement useful for coordinating activities within and among departments. Besides performance measurement being useful for improving cooperation and coordination among people within the organization, it also does do outside the organization with its partners (Franco-Santos et al., 2012).

Sixth, performance measurement can also have an effect on the regeneration of an organization as it has been found to have an effect on the ability to exploit existing strategic capabilities and the capacity to identify and develop new strategic capabilities (Grafton et al., 2010). It can also increase employees' understanding of how to apply the firm's strategy, leads to greater knowledge exchange among employees, and enables them to create new knowledge (Groen et al., 2012).

Seventh, performance measurement and firm culture have been found to be connected to each other. Through performance measurement, people in the organization become more proactive, more committed to the organization, and more oriented to processes that help achieve organizational results (de Waal and Kourtit, 2013). The findings of Burney et al. (2009) and Lau and Sholihin (2005) indicate that organizations with well-defined and specified performance measures, either financial or non-financial, result in higher levels of procedural justice and trust in supervisors, which subsequently generates higher levels of employee job satisfaction. If employees perceive fairness in the way performance is evaluated, it increases job satisfaction (Lau and Sholihin, 2005). Similarly, Lawson et al. (2003) found that the performance measurement system resulted in a significant improvement in employee satisfaction.

Eight, performance measurement may also have a positive effect on an individual's performance and motivation towards the achievement of strategic objectives (Dumond, 1994; Hall, 2008). The findings of Dumond (1994) suggest that performance measurement has a positive effect on an individual's performance, decision-making, and job satisfaction. If organizational members have a higher orientation to achieve organizational results by using performance measurement, it can help attain those results. The strengthened focus on what is important for the organization, coupled with the improvement in the decision-making, facilitates the achievement of organizational goals (de Waal and Kourtit, 2013). When studying the effect of performance measurement on motivation, Decoene and Bruggeman (2006) found that to create positive motivation for higher levels of performance, the objectives must be strategically aligned. Burney et al. (2009) found that the adoption of performance measurement, linked to monetary rewards, positively affects employees' citizenship behavior through the positive effect the use of this system has on procedural justice.

However, another stream of literature suggests that performance measurement is not essential for running a well-performing organization (e.g., Johnson and Broms, 2000). Reviewing the current literature, Franco-Santos et al. (2012) found that performance measurement in some cases may be a time-consuming exercise that can increase costs and workloads and generate internal tensions. It can also bring about judgment biases and perceptions of unfairness or subjectivity when used for performance evaluation and compensation purposes. Organizations that have clear policies and actions with genuine beliefs may not benefit from formal monitoring of individual performance (Sobótka and Platts, 2010). Henri (2006b) also found that the diagnostic use of performance measurement weakens organizational capabilities in terms of innovation and organizational learning. Increased control does not lead anywhere by itself: organizations need to learn to perform, with or without performance measures (Bititci et al., 2011).

2.2.3 Innovation performance measurement

Performance management literature has noticed the importance of taking account of innovation performance measurement as a part of performance measurement and management. Kaplan and Atkinson (1998) regarded innovation as one of the main business processes of an organization. Adams et al. (2006) observed that innovation performance measurement does not appear to take place routinely within management practice in organizations. Innovation in organizations can be non-linear, fuzzy, or ill defined, rather than being dependent on cause and effect rationale (Ford, 2000). This is amplified in SMEs where

complexity of innovation is determined by issues such as scarcity of resources, lack of skills, skepticism towards formal training, the need for flexibility and lack of systematic innovation performance measurement (Lee et al., 2000; McAdam et al., 2010). Many authors have suggested that the competitiveness of SMEs can be increased through innovation by defining innovation more consistently and paying attention to innovation performance measurement (Gorton, 2000; McAdam and Keogh, 2004). As pointed out by Neely et al. (2000), performance measurement must not be seen as obtrusive and contradictory within innovation. When performance measurement has been conducted in a proper way, it can boost innovation. According to Skarzynski and Gibson (2008), measures of innovation can help managers in two ways: first, to make informed decisions based on objective data; and second, to help align goals and daily endeavors for near- and long-term innovation goals. Especially in the context of innovation, the measures should be dynamic and changeable and be continually reviewed and developed during the transitional process of developing the innovation capability (Neely et al., 2000; McAdam and Keogh, 2004). It is also emphasized that measuring innovation must be given more strategic and operational importance and a wide range of measures of innovation should be adopted, reflecting the diversity within innovation (McAdam and Keogh, 2004). After all, the management of innovation demands appropriate controlling and performance measurement approaches (Schentler et al., 2010).

Appropriate performance measures can contribute to a significantly better understanding of innovation. To be effective, any measure should focus attention on the critical success factors in the particular business and its sector of activity (Birchall et al., 2011). Similarly, Tidd et al. (2005) argue that innovation performance measurement must relate the firm's innovation to its success in the marketplace. Thus, it is significant to evaluate the innovation accurately, and to find the key factors influencing innovation (Shan and Zhang, 2009). If the prime aim of innovation is to create new, better value for the customer or end user so as to gain improved return on investment, then the factors likely to provide that success are key areas for innovation performance measurement (Birchall et al., 2004). Literature on innovation performance measurement stress the importance to measure a wide number of determinants including areas like innovation strategy; ideas and ideation; customer and market; organizational learning and knowledge management tools; and organizational culture and leadership (Adams et al., 2006; Crossan and Apaydin, 2010).

However, the development of comprehensive measures of innovation to support innovation in SMEs is often limited within production-oriented measures (Freel, 2000). According to Birchall et al. (2011) a number of perspectives have been presented on the topic. At the firm level, these include: the effectiveness of R&D investment, the effectiveness of the new

product development process, the effectiveness of the management of change, and the degree to which enablers of innovation are present and hence the future secured.

Generally, four types of innovation performance measurement can be subsumed: input, process, output, and outcome. Input measurement represents the resources provided for innovation, for example, personnel, funds, equipment, and ideas (c.f., Skarzynski and Gibson, 2008; Janssen et al., 2011). Process measurement indicates how the mechanism between the inputs and outputs of innovation occur (Carayannis and Provance, 2008). Process measures include the achievement of time, cost, and quality objectives as well as the project progress. Output measurement reflects the direct results of innovation activities (i.e., new products or generated knowledge) and helps identify trends and developments over time. Outcome measurement demonstrates innovation success in the market and thus focuses on revenue, profit, market share, and customer satisfaction (Janssen et al., 2011). Thus, outcomes represent the performance implications of innovation. Adams et al. (2006) reviewed current measures of innovation and found that measurement tends to focus on output measurement. Carayannis and Provance (2008) discussed how coherent measurement of the performance implications of innovation requires the consideration of input, process, and output measurement simultaneously. A wide range of innovation measures should be adopted, because single or more limited measures do not offer information comprehensive enough that managing innovation requires (McAdam and Keogh, 2004; Carayannis and Provance, 2008).

Results from Janssen et al. (2011) underline the importance of a balanced set of innovation measures since a balanced framework increases the extent to which innovation performance measurement is used. Moreover, innovation performance measurement should cover financial as well as nonfinancial aspects (Janssen et al., 2011). Measurement should make the relationships among objectives explicit so that they can be managed and validated (Kaplan and Atkinson, 1998). Linkages to both cause-and-effect relationships and mixtures of performance implications and performance drivers (innovation inputs, process, and outputs) by considering dependencies, time lags, etc. should be incorporated (c.f., Kaplan and Atkinson, 1998; Janssen et al., 2011). Performance implications without performance drivers do not communicate how the implications are to be achieved (Kaplan and Atkinson, 1998).

It is necessary to understand the nature of the innovation in order to align innovation performance measurement and enable more actionable outcomes from measurement. It is important to define the areas in which innovation performance measurement is most needed in order to support decision-makers in the design of measurement and the selection of appropriate measures (Birchall et al., 2011). Neely et al. (2000) argue that measurement

frameworks often fail to account for the diversity and requirements within individual organizations. To avoid this they suggest that the frameworks should be "a set of design guidelines designed to inform the development of a process for performance measurement system design" (Neely, 2000, p. 1120). Innovation performance measurement differs depending on the characteristics of the dominant determinants in each market and technological environment, and thus measurement has to be adapted to its specific needs (Perez-Freije and Enkel, 2007). This would imply that the firm should design innovation performance measurement appropriate to their own particular situation. It can be dependent upon the outcomes being pursued from innovation (Birchall et al., 2011). Innovation measures are not an end point, rather dynamic phenomena that must be continually reviewed and developed during the transitional period when innovation is developed (McAdam and Keogh, 2004).

2.3 Conceptual framework of the research

Even though the prior literature described in the previous sections explains somewhat the grounds as well as the performance implications for innovation, earlier empirical research has not produced unanimous evidence of the effects of innovation capability on SME performance. There is also a lack of studies, especially ones that take into account the role of innovation capability in innovation performance measurement. This includes both how innovation performance measurement of SMEs should be conducted and its effects. This ambiguity could be attributed to the fact that earlier research has examined the issue only through the lenses of a single research field (c.f., performance management field or innovation management field), and thus lacks cross-disciplinary studies that could help prevent its fragmentation. In order to understand how to manage performance through measuring and managing innovation capability in SMEs, the conceptual framework has been built by using both performance management and innovation management research. The conceptual framework of the research (Figure 3) is built on the basis of the current literature in the context of the topic introduced above. The main focus has been in performance management literature, complementing it with insights from innovation management field.

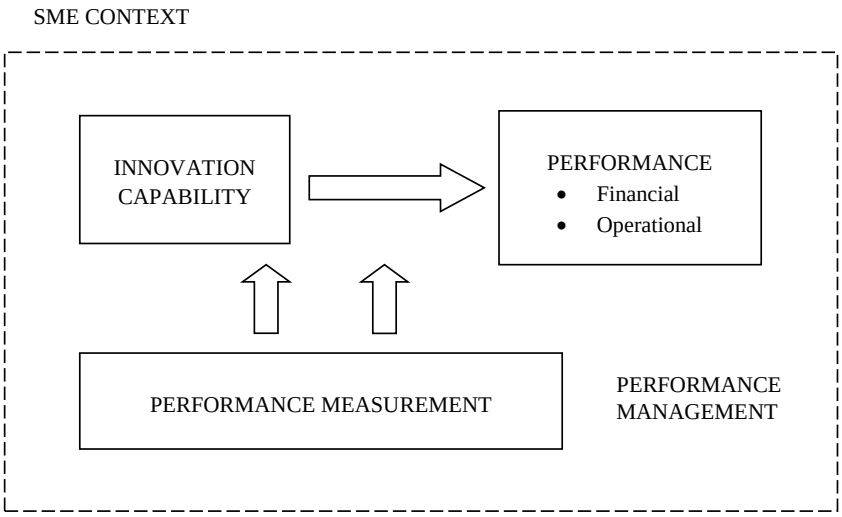

Figure 3. Conceptual framework of the research

Innovation management literature has widely highlighted that innovation capability is one of the most important dynamics that enables SMEs to achieve a high level of competitiveness. Thus, promoting and sustaining an improved innovation capability should be the key focus area of SMEs (Çakar and Ertürk, 2010). The literature on innovation management contains frameworks examining the different areas of innovation capability (c.f. Lawson and Samson, 2001). These frameworks are on a very general level and the approaches have been designed primarily for large firm contexts. However, SMEs have distinct characteristics that differentiate them for larger firms (c.f., Garengo et al., 2005; Singh et al., 2008). The current approaches and frameworks do not give instructions on how SMEs specifically can develop their innovation capability through performance measurement.

There have also been few attempts to use a performance management approach in the development of innovation capability within SMEs. However, SMEs could benefit from performance measurement and management when improving their innovation capability. The extant research has examined various effects of performance measurement, but only a few have studied the effects of performance measurement on innovation capability (Franco-Santos et al., 2012). Performance measurement is today seen as a comprehensive process, which means that all things happening in the organization are considered to have an effect on the performance of the organization. Thus, performance measurement is not contradictory within innovation (Neely, 2000), but rather can be used as a tool for developing innovation capability.

Further, the extant research merely focuses on either the relationship between innovation capability and performance or effects of performance measurement, instead of combining these two. There seems to be a research gap regarding performance measurement and management through innovation capability in SMEs. Thus, the current research attempts to address this research gap.

3 RESEARCH METHODOLOGY

This chapter presents the research methodology employed in the research. First, the research approach is presented, including the philosophical foundation of the research. Second, data collection and analysis methods are introduced. Third, the quality of the research is assessed.

3.1 Research approach

There are four basic elements of any research: epistemology, theoretical perspective, methodology and methods (see Figure 4). Epistemology is a way of understanding and explaining how we know what we know (Crotty, 1998). The current literature introduces several epistemological traditions. On the basis of one division presented by Crotty (1998), the three main epistemological views are objectivism, constructionism, and subjectivism, though they should not be seen as watertight compartments. Objectivism is the epistemological view that things exist as meaningful entities independently of consciousness and experience. In this objectivist view, understandings and values are considered to be objectified in the people we are studying and, if we go about it in the right way, we can discover the objective truth. Constructionism rejects this view of human knowledge. Truth, or meaning, comes into existence in and out of our engagement with the realities in our world. Meaning is not discovered, but constructed. In subjectivism, meaning does not come out of interplay between subject and object but is imposed on the object by the subject. Meaning comes from an interaction between the subject and the object to which it is ascribed (Crotty, 1998). These traditions are not completely opposite and separable, although they have often been positioned as so. Especially in the management field, there are many researchers who adopt a pragmatic view by deliberately combining methods drawn from different traditions (Easterby-Smith et al., 2002).

In addition to epistemological considerations, the philosophical foundation of scientific research can be characterized by the means of ontology. Ontology is the study of being (Crotty, 1998). The central point for orientation here is the question of whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors (Bryman, 2008). Ontology is closely tied to the epistemological foundation of the research. For example, realism (an ontological notion asserting that realities exist outside the mind) is often taken to imply objectivism (an epistemological notion asserting that meaning exists in objects independently of any consciousness) (Crotty, 1998).

Finally, axiology influences research, in addition to epistemology and ontology. Axiology refers to the role of values in performing a particular research (Saunders et al., 2009).

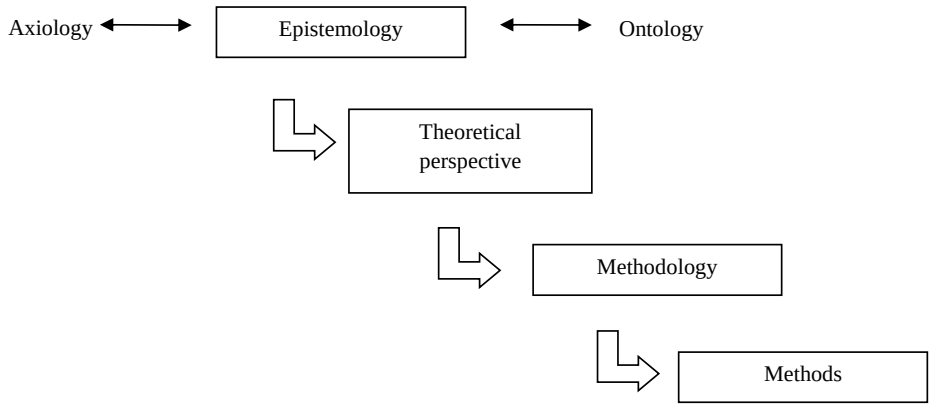

Figure 4. Elements of scientific research (modified from Crotty, 1998)

The second element of scientific research is theoretical perspective. Theoretical perspective means the philosophical stance informing the methodology and thus providing a context for the process and grounding its logic and criteria. Both epistemology and ontology inform the theoretical perspective of the research, for each theoretical perspective embodies a certain way of understanding what is (ontology) as well as a certain way of understanding what it means to know (epistemology) (Crotty, 1998).

According to Saunders et al. (2009), there are four main traditions of management research: positivism, realism, interpretivism, and pragmatism (see Table 1). The positivist approach maintains that a true explanation or cause of an event or social pattern can be found and tested by scientific standards of verification (Easterby-Smith et al., 2002). Realism and positivism are close to each other, and usually quantitative methods are adopted (Saunders et al., 2009). The interpretivist approach does not seek an objective truth so much as unravelling patterns of subjective understanding (Easterby-Smith et al., 2002). Pragmatism is closely related to interpretivism. Pragmatism stresses the importance action and practical orientation in conducting research (Saunders et al., 2009). In management research, the basic separation is usually made by positivism and interpretivism.

Table 1. Four main theoretical perspectives of management research (Saunders et al., 2009)

	Positivism	***Realism***	***Interpretivism***	***Pragmatism***
Ontology**:** the researchers' view of the nature of reality or being	External, objective, and independent of social actors.	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence, but is interpreted through social conditioning.	Socially constructed, subjective, may change, multiple.	External, multiple, view chosen to best enable answering of research question.
Epistemology**:** the researchers' view regarding what constitutes acceptable knowledge	Only observable phenomena can provide credible data, facts. Focus on causality and law like generalizations, reducing phenomena to simplest elements.	Observable phenomena provide credible data, facts. Focus on explaining within a context or contexts.	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions.	Either or both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret the data.
Axiology**:** the researchers' view of the role of values in research	Research is undertaken in a value-free way; the researcher is independent of the data and maintains an objective stance.	Research is value laden; the researcher is biased by worldviews, cultural experiences, and upbringing. These will impact on the research.	Research is value bound; the researcher is part of what is being researched, cannot be separated, and so will be subjective.	Values play a large role in interpreting results; the researcher adopting both objective and subjective points of view.
Data collection techniques most often used	Highly structured, large samples; measurement, quantitative, but can use qualitative.	Methods chosen must fit the subject matter; quantitative or qualitative.	Small samples, in-depth investigations, qualitative.	Mixed or multiple method designs; quantitative or qualitative

An important factor linked to the theoretical perspective is the nature of the relationship between theory and research. It can be divided on the basis of whether theory guides research (known as a deductive approach) or whether theory is an outcome of research (known as an inductive approach) (Bryman, 2008). In induction, general conclusions are drawn from empirical observations and in deduction, through logical reasoning (Ghauri and Grønhaug, 2010). Abductive reasoning is to be seen as a mixture of deductive and inductive approaches. Inductive and abductive approaches are fruitful if the researcher's objective is to discover new

things—other variables and other relationships; the deductive approach is concerned with developing propositions from current theory and making them testable in the real world (Dubois and Gadde, 2002).

Theoretical perspective also informs the methodology used in research. Methodology refers to the strategy, plan of action, process, or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes. Finally, methods refer to the techniques or procedures used to gather and analyse data related to some research question or hypothesis (Crotty, 1998).

This research follows the positivist approach. The positivist approach contains two assumptions: first, an ontological assumption, that reality is external and objective; and second, an epistemological assumption, that knowledge is only of significance if it is based on observations of this external reality (Easterby-Smith et al., 2002). Research is undertaken in a value-free way, meaning that the researcher is independent of the data and maintains an objective stance (Saunders et al., 2009), which reflects the axiology of the research.

Deductive reasoning logic is adopted. Deductive reasoning has at least the following characteristics: a search to explain causal relationships between variables; structured methodology to facilitate replication; concepts need to be operationalized in a way that enables facts to be measured quantitatively; reductionism, which means that problems as a whole are better understood if they are reduced to the simplest possible elements; and generalisation by selecting a sample of sufficient numerical size (Saunders et al., 2009). However, the division between deductive and inductive reasoning is not that clear. Deduction may entail an element of induction, while an inductive process is also likely to entail a little deduction. For example, quantitative methods, which usually apply a deductive approach, can include methods that utilize inductive reasoning, e.g., factor analysis (Bryman, 2008). The researcher in deductive research builds hypotheses from existing knowledge that can be subject to empirical testing and thus can be accepted or rejected (Ghauri and Grønhaug, 2010). Surveys are often associated with the deductive approach (Saunders et al., 2009). Also, complementing data sources (e.g., literature reviews) can be used for deductive reasoning (Coughlan et al., 2007). In this research, publications I-IV adopt mainly deductive reasoning via survey, while in publication V the contribution is provided by deductive reasoning via conceptual development. From a methodological point of view, quantitative and complementing conceptual methods of data collection are utilized.

3.2 Data collection and analysis

Quantitative research methods

Sampling frame

Quantitative data was utilized in publications I-IV. The data set was gathered with a structured survey questionnaire from a cross-section of firms in both manufacturing and service sectors in Finland. The initial sample was 2,400 SMEs, employing 10-249 persons and with less than 50 million euros in revenue. The sample was randomly selected with three restrictions: First, it was required that the firm had more than 10 employees to ensure the routines and processes of innovation capability to take place. The second restriction was made because, according to Neely and Hii (1998), collecting data just from top executives of organizations does not provide a true measure of the entire organization's behavior as regards innovation; thus, the survey was sent to both representatives of management and employees to make sure that both views would be represented in the study. Third, a valid e-mail address for each selected respondent was required, because the survey was web-based. 8,214 firms that met these three restrictions were found from the database. Although there are more SMEs that employ 10-249 employees and have revenue of 2-50 million euros in Finland, only 8,214 firms met the other requirements. The initial sample of 2,400 firms was selected randomly from among these 8,214 firms. The initial mail out included 4,800 surveys (management and employees of the selected 2,400 firms) of which 4,050 reached the respondents, as 750 e-mail addresses were invalid. After excluding the invalid e-mail addresses, the survey reached 1,978 representatives of management and 2,072 representatives of employees. One week after the survey was first mailed, reminder surveys were sent out. Three follow-up e-mails (each at one week after the previous reminder) were sent to those who had not yet responded. This process resulted in 311 responses, which equals a response rate of 7.68 percent. The response rate from management was 11.22 percent (222 responses) and from employees was 3.86 percent (80 responses).

Respondent demographics

After the responses were received, the data was screened. Responses were excluded if they met some of the following criteria: first, if most of the items included missing values; second, if it was clear that the responses were deliberately incorrect throughout the survey (i.e., the best possible response was selected in all of the survey items); third, if there were inconsistencies in the responses. These actions also assisted in the need to make sure that no

contradictory responses were received from the same firm. As a result, two cases (where multiple responses from the same firm were received) remained. These two responses were passed because they were not contradictory and not seen to pervert the results. Thus, the 311 responses (Table 2) reflect firm level responses. When data was missing, the response was excluded in the analysis. For example, if the position of the respondent was not known, the response was not included in the analysis that required position information.

Table 2. Firm level background information of the responses

		n	**%**
Revenue (million euros)	2-5	141	45.3
	5-20	135	43.4
	20-50	35	11.3
No. of employees	10-49	224	72.0
	50-249	87	28.0
Industry	Industrial	145	46.6
	Service	159	51.1
	No response	7	2.3
Location	Southern Finland	164	52.7
	Western Finland	74	23.8
	Eastern Finland	32	10.3
	Northern Finland	29	9.3
	No response	12	3.9

About 45 percent of the firms had revenue of 2-5 million euros and about 43 percent 5-20 million euros. A little over 10 percent had revenue of more than 20 million euros. 72 percent of the respondents represented small firms with less than 50 employees. 28 percent of the responses came from medium-sized firms. The responses are quite equally divided into industrial and service firms. About 51 percent of the responses came from the service sector and about 47 percent from the industrial sector. The survey also asked respondents to indicate the location of the firm. The majority of the responses came from firms located in southern Finland (about 53 percent), about 24 percent from western Finland, about 10 percent from eastern Finland, and less than 10 percent from northern Finland. However, when majority of the firms are located in southern and westerns parts of Finland, the division of responses represent Finnish SMEs. The majority of the responses were received from executives, and about 30 percent of the responses were from employees.

Bias

An analysis of variance test was performed to check the non-response bias. The potential for non-response bias can be assessed by comparing the means of the responses in the last

quartile to those responses in the first three. It was assumed that those who were among the last to respond most closely resembled non-respondents (Armstrong and Overton, 1977). The respondents were divided into four groups: the first respondents, the first follow-ups, the second follow-ups, and the third follow-ups. The analysis of variance test results revealed that there was no significant difference (at the 5 percent significance level) in the responses between the four groups regarding the constructs. In addition, management response and employee response analysis of variance tests were made separately. No significant differences were discovered in either group. Thus, non-response bias was not considered an issue in this study.

Because the sample was selected randomly, the background of the respondents was not checked. Managers usually have good prerequisites to answer the items. However, employees' view was seen as important because they are not influenced exclusively by formal policies and practices. Moreover, it is what they perceive and experience on a daily basis that matters. A number of methods were used to improve the reliability of self-reported information. For example, ambiguous items were clarified; closed items, where the answer must be taken from a predetermined list, were used to get comparable data; respondents were allowed to bypass an item if they did not have enough information to answer—required because the respondent must have a reasonable amount of information to be able to respond to items. If the respondent did not have knowledge or experience or, or opinion on any item, then an additional option had to be provided. This was anticipated as possibly being the case with employee respondents, and so (in addition to a Likert middle option) they were offered the opportunity to pass over the item by choosing the option "I cannot say."

The sample was selected randomly, which can minimize voluntary response bias and under coverage bias. By assessing this kind of selection biases, the representativeness of the sample can be ensured. In this way, it is likely that different types of SMEs are adequately represented in the sample. Some procedural remedies were also used to minimize the potential effects of the common method bias, which is required when a single key respondent for an organization is used (Podsakoff et al., 2003). In the cover letter, the respondents were encouraged to answer the items as truthfully as possible. Respondents were allowed to answer anonymously, which meant they were less likely to edit their responses to be more socially desirable. Another way of reducing common method biases is careful construction of the items. This technique was used by paying attention to the wording and clarity. The items were also reviewed and revised by a group of researchers familiar with the topic. In addition to procedural techniques, Harman's single-factor test was used to statistically address the issue of common method bias. All of the variables used in the study were loaded into exploratory

factor analysis, and the unrotated factor solution was analyzed. Either of the criteria of the technique (i.e., emergence of a single factor from the factor analysis or one general factor accounting for the majority of the covariance of the measures) was met. Thus, no significant common method variance exists (Podsakoff et al., 2003).

Variable measurement

There was no comprehensive scale on which to measure innovation capability and its performance measurement; therefore, the scales used had first to be developed. The unit of analysis in the study is the individual respondent's perceptions of innovation capability, performance measurement, and performance at an organizational level. Innovation capability was measured via subjective measures, as well as performance measurement. It has been stated that objective measurements have greater validity than subjective ones. However, it has been demonstrated in the literature that there is a high correlation and concurrent validity between objective and subjective measurements (e.g., Venkatraman and Ramanujan, 1987). Therefore, in this research, self-reported subjective measures of firm performance were adopted. The scale contained two subjective items (financial performance and operational performance over the past 3 years). Performance refers here to organizational level performance perceived by the individual respondent, which reflects the extent and degree to which the employee evaluates how the whole organization performs. Thus, performance is the subjective perception of the individual respondent. Objective performance measures were not used for multiple reasons: respondents may not have accurate information to provide about performance measures; finding the actual numerical value would have required extra work for the respondent; the respondent may also be more reluctant to provide objective performance information than perceptual, which also advocates the use of perceptual measures. Indeed, operational performance reflects outcomes that do not necessarily exist in the comparable (for example, between industries) or directly observable sense. In such cases, objective measures are clearly inappropriate. By using subjective data, the aim was to ensure comparability between different kinds of firms. Subjective items are suggested to decrease the effect of contextual factors. Thus, a comparison of SMEs of different sizes and in different sectors is easier. Multiple items of performance were used to increase the reliability. Both performance items were measured with the same scale; it was deemed appropriate to use perceptual items in both performance items. In addition, three control variables (revenue, number of employees, and industry) were also included. All measures used were assessed at the firm level. The scales and their construction are discussed in more detail in the publications. The survey items are presented in the Appendix.

Construct validity (i.e., whether or not the research truly measures what it intends to measure) of the scales is established by assessing content validity, criterion validity, and discriminant validity (Hair et al., 2006). To ensure content validity, a literature review was used to help in developing the pre-understanding of constructing the scales. When possible and appropriate, existing measurements that had been empirically tested in previous studies were used. New items were built based on theories. In addition to adapting constructs from previous research, all measurements included in the final survey were evaluated for content validity by a five-member panel of researchers. Criterion validity was assessed through correlation analyses, which show that the constructs behave in a credible manner. Discriminant validity was assessed through exploratory factor analyses, which support the uni-dimensionality of the scales. Also, the lack of significant cross-loadings supports discriminant validity.

Reliability, which measures the extent to which the items in a scale represent the same phenomenon (Nunnally, 1978), was assessed by computing Cronbach's Alpha. The alpha values of six factors of innovation capability, performance measurement and performance were greater than 0.60, which is acceptable (De Vellis, 1991). However, for scales with a small number of items and for new scales, a smaller alpha is considered permissible (Nunnally, 1978). In one factor of innovation capability (individual activity), the alpha value was less than 0.50, which indicates that the reliability of the factor could be questioned. Therefore, the results involving that factor should be handled circumspectly. The validity and reliability of the scales are discussed in more detail in the publications.

Analyses

The survey data was analysed by means of analysis of variance for publication I and by means of linear regression analysis for publications II-IV. Analysis of variance was chosen to analyze differences between groups of responses. Publication I assessed the effects of firm size and industry on the determinants of innovation capability. Also, a preliminary division of the determinants of innovation capability was presented. For publication II, the determinants of innovation capability were used as independent variables explaining the firm's performance. Principal component analysis was used in publication III, where the final division of determinants of innovation capability were identified. Principal component analysis was chosen to find hidden structures from among variables, i.e., factor is the abstract hidden dimension, which reflects the individual variables. Thus, the goal was to compress the data to a reasonable amount. Publication III also investigated the effect of performance measurement on the determinants of innovation capability by means of linear regression analyses. In publication IV, the determinants of innovation capability were set as independent

variables, and with the assistance of the moderating variable, performance measurement, explaining a firm's performance. In these publications, regression analysis was chosen to determine connections between variables. A particular advantage of linear regression is that it can be used to examine the simultaneous effect of several variables. Further discussion of the analysis and the results can be found in the publications. Table 3 summarizes the measures and analyses used in the quantitative publications.

Table 3. Summary of the measures and analyses used

	Independent variables	***Dependent variables***	***Moderator variable***	***Control variables***	***Analyses***
Publication I	Size; industry (objective)	Determinants of innovation capability (subjective)	-	-	Analysis of variance
Publication II	Determinants of innovation capability (subjective)	Firm performance (subjective)	-	Size; industry (objective)	Linear regression analysis
Publication III	Performance measurement (subjective)	Determinants of innovation capability (subjective)	-	Size; industry (objective)	Linear regression analysis Principal component analysis
Publication IV	Determinants of innovation capability (subjective)	Firm performance (subjective)	Performance measurement (subjective)	Size; industry (objective)	Linear regression analysis

The used analyses require normal distribution of the data. Normal distribution should be assessed by using both graphical plots and statistical tests to find out the actual degree of departure from normality. Both methods were used to check the distribution of the data. A normal probability plot, which compares the cumulative distribution of actual data values with the cumulative distribution of a normal distribution (Landau and Everitt, 2004), was checked. Skewness values were also calculated for all responses, with management responses and employee responses calculated separately. Skewness values outside the range of -1 to +1 are often defined as indicating a substantially skewed distribution (Hair et al., 2006). Based on these, the data was deduced to be in normal distribution ranges.

Complementing research methods

In addition to the survey study, the research included complementing research method in terms of literature review. These kinds of secondary sources not only help the researcher to better formulate and understand the research problem but also broaden the base from which

scientific conclusions can be drawn (Ghauri and Grønhaug, 2010). This deductive conceptual research was utilized in publication V.

The purpose of the review was to collect existing theoretical and empirical evidence for the interface of performance management and innovation management research by concentrating on innovation performance measurement. Based on the review, the objective was to increase understanding of the measurement and management of innovation capability in order to enhance firm performance. Analyses regarding publication V were made concurrently with the preliminary results of the quantitative study. Thus, publication V draws on the findings and cumulative knowledge of the quantitative study in presenting a framework for innovation performance measurement.

The articles included in the review were searched from international journal databases (e.g., ISI Web of Knowledge, Scopus, ABI, and EBSCOHost). The keywords used in the search were 'innovation capability,' 'innovation measurement,' 'measurement,' 'performance measurement,' and 'performance,' and their combinations. A complementary search via Google Scholar was conducted in order to find other relevant papers (e.g., working papers) on the topic. The selection of articles was made based on the analysis of titles, keywords, and abstracts. Due to the cross-disciplinary nature and multiple perspectives of both performance management and innovation management literature, the selected articles were those published in a wide scope of journals. These included, for example, journals concentrating on the fields of general management, performance management, operations management, strategy, innovation management, technology management, new product development, and small business. These perspectives lead to a more comprehensive understanding regarding the topic.

3.3 Quality of the research

In the positivist tradition, the quality of the research is assessed by its validity, reliability, and generalizability. Generally, validity means investigating whether the measures correspond closely to reality (Easterby-Smith et al., 2002). There are three main kinds of validity: construct validity, internal validity and external validity.

Construct validity refers to the extent to which operationalization measures the concept which it intends to measure (Ghauri and Grønhaug, 2010). To ensure construct validity regarding the quantitative part of the research, content validity, criterion validity and discriminant validity were assessed as suggested by Hair et al. (2006). Construct validity was ensured by conducting correlation analyses and exploratory factor analyses as well as building the scales

on a solid theoretical basis and by using items from earlier reported scales. A literature review was used to evaluate the results. In the literature review, previously used terms were used. Further, the used terms were carefully described and explained.

Internal validity describes whether the research design is capable of eliminating bias and the effect of extraneous variables (Easterby-Smith et al., 2002). In the quantitative part, statistical analyses were performed to check the non-response bias. Also, the effect of control variables that might have an effect on the results was checked. For the literature review, the articles were selected in the review in a way that enabled a representative portion of the research conducted on the topic. The individual publications of the research have been presented in scientific arenas, including scientific books and peer-reviewed journals, which increases the internal validity.

In this type of research, *external validity* usually means defining the domains to which the results of the study may be generalized (Easterby-Smith et al., 2002). *Generalizability* refers to the extent to which the findings of the research that has been conducted are relevant in another setting or situation (Stokes, 2011). In the quantitative part of the research, the sample was selected in way that well represents the target group and thus enables generalizability of the results. The results have then been validated and refined by interplay with a complementing research method, which increases the generalizability of the results.

Reliability refers to the extent to which the data collection techniques and analysis procedures will yield consistent findings (Saunders et al., 2009). For the quantitative part of this research, as well as validity, reliability was achieved by following an exact procedure in performing the statistical analysis, from data collection to interpretation. In the quantitative part of the research, the data was not collected in time order. This is common when cross-sectional data is used. However, the perception of a respondent develops over time and is path-dependent. Although innovation capability and other variables are evaluated simultaneously, perception of innovation capability is made now, but it represents the past. Reliability of the part utilizing complementing research methods has been ensured by undertaking a detailed and critical review of the existing literature, and by providing both supportive and opposing viewpoints as well as different perspectives to the problem statement. The final framework presented in publication V was based on and identified from quantitative data and prior literature problems. The transparency of the research process, as well as utilizing multiple researchers in the analysis, has increased the reliability of the results.

4 SUMMARY OF THE PUBLICATIONS AND RESULTS

In this chapter, the summaries of the five publications comprising the second part of the thesis are presented. The positioning of each of the publications regarding the conceptual framework of the research is presented in the Figure 5. Also, the results of the research are presented by providing answers to the two main research questions via their sub questions. Summaries of the publications' background and objectives, findings, and main contributions are clarified.

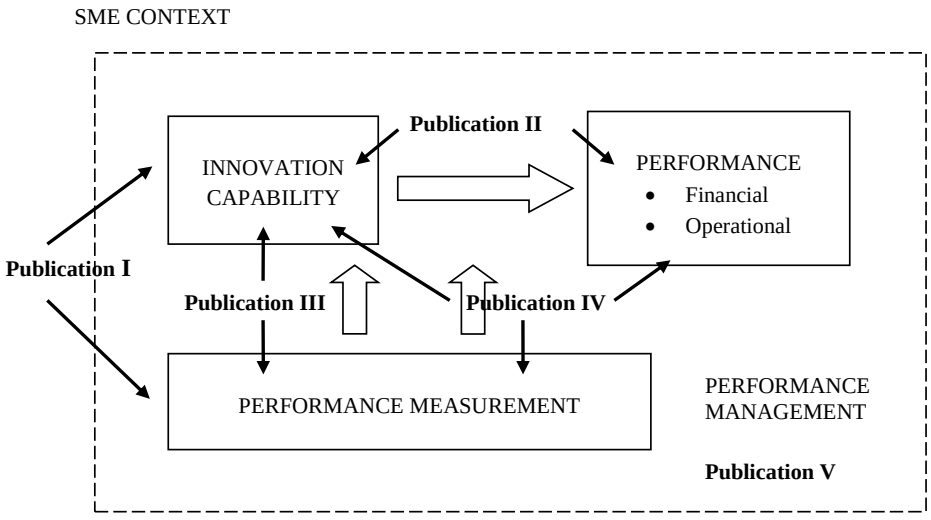

Figure 5. Publications and their connections to the conceptual framework of the research

4.1 Summary of the publications

The five publications have their own role in the thesis as introduced above. These publications build an understanding for the final conclusions of the thesis. Publications I, II, and III are connected to the first main research question: *Does SME innovation capability affect performance?* Publications III, IV and V aim to answer the second main research question: *How does performance measurement promote the relationship between innovation capability and performance in SMEs?* Publication I provides a basic understanding of innovation capability in the SME context and reveals what the determinants are that form innovation capability in SMEs. Publication II reveals the importance of innovation capability in SME performance. Publication II studies the effects of innovation capability in SME performance in the perspectives of management and employees. Publications III and IV study the role of performance measurement in developing innovation capability and performance.

Publication III examines the connection between performance measurement and innovation capability. Publication IV studies the moderating effect of performance measurement when developing innovation capability in order to achieve higher performance. In addition, publication III provides the further developed definition of the determinants of innovation capability. In publication V, a wider perspective of performance management is applied by examining how performance measurement can be arranged to support developing innovation capability and further SME performance.

Table 4 summarizes the publications by introducing briefly the titles, objectives, research questions, main findings, and the main contribution of publications to the thesis. Thus, the overview of the publications provides a basis for the conclusions drawn in the following chapter.

Table 4. Summary of the results of the publications

	Publication I	***Publication II***	***Publication III***	***Publication IV***	***Publication V***
Title	Innovation capability and its measurement in Finnish SMEs	Role of innovation capability in achieving higher performance	Facilitating innovation capability through performance measurement: A study of Finnish SMEs	The relationship between innovation capability and performance: the moderating effect of measurement	A conceptual framework for the measurement of innovation capability and its effects
Main objective	To clarify the concept of innovation capability in the SME context. To examine how innovation capability differs along with the size and industry	To examine the relationship between the determinants of innovation capability and firm performance	To examine the relationship between performance measurement and the determinants of innovation capability	To explore if innovation capability–performance relationship can be moderated through performance measurement	To define how innovation capability should be measured in order to enhance performance
RQ	1a	1b	1a, 2a	2a	2b
Main findings	Innovation capability of SMEs consists of determinants. Size and industry have not significant effects on the determinants of innovation capability	Three determinants (ideation and organizing structures, know-how development, and participatory leadership culture) of innovation capability affect performance	Seven determinants of innovation capability. The determinants of innovation capability can be affected by performance measurement	Performance measurement moderates the relationship between innovation capability and performance	Innovation performance measurement is needed along multiple levels and phases. Innovation measures and performance measures need to be linked to each other
Main contribution to the thesis	Effects of contextual factors on SME innovation capability	Determinants of innovation capability that affect performance	Defining seven determinants of innovation capability. Effects of performance measurement on the determinants of innovation capability	Role of performance measurement as a moderator of innovation capability–performance relationship	Guidelines for measuring and managing innovation capability in order to enhance performance

4.2 Role of innovation capability in SMEs and their performance

4.2.1 Determinants of innovation capability

In the sub-question 1a, *Which determinants form innovation capability of SMEs?* was examined. This issue was examined in publications I—*Innovation capability and its*

measurement in Finnish SMEs—and III—*Facilitating innovation capability through performance measurement: A study of Finnish SMEs.*

Publications I and III

BACKGROUND AND OBJECTIVES

The objective of publication I was to define innovation capability and its determinants in the SME context. In this respect, whether innovation capability differs along with the size and industry of the firm was clarified. Publication III refined the division of the determinants of innovation capability further. Existing research on innovation capability is fragmented and no dominant theoretical perspective integrates the individual sections of innovation research. Current research does not study innovation capability in the SME context, where orientations towards innovation are more important than generating new products and services in the marketplace. By defining the determinants of innovation capability, the goal was to highlight the routines and processes that affect a firm's ability to perform innovation.

MAIN FINDINGS

In general, the findings support the view that innovation capability is a multi-faceted construct including both internal and external determinants as well as determinants of organizational issues and issues concerning the employees. The studies identified seven determinants that form innovation capability in SMEs: innovation capability is determined by the state of participatory leadership culture, ideation and organizing structures, work climate and well-being, know-how development, regeneration, the behavior of exploiting external knowledge, and the individual activity of the employees. A summary of the determinants is presented in Table 5.

Table 5. Determinants of innovation capability of SMEs

Determinant		*Authors*
Participatory leadership culture	Encouragement	cf., McDonough, 2000; Harbone and Johne, 2003; Hausman, 2005; Aragón-Correa et al., 2007; Bullinger et al., 2007; Dobni, 2008; Smith et al., 2008; Kallio et al., 2012
	Positive feedback	
	Respecting employees' ideas	
	Participation of managers	
	Tacit knowledge transfer	
	Appreciation of employees	
Ideation and organizing structures	Ideation structures	cf., Subramanian and Nilakanta, 1996; Lampikoski and Emden, 1999; Lawson and Samson, 2001; Adams et al., 2006; Bullinger et al., 2007; Dixit and Nanda, 2011; Martínez-Román et al., 2011; Kallio et al., 2012
	Feedback for ideas	
	Encouraging rewards	
	Work orientation	
	Work requirements in line with innovation	
	Work organizing	
Work climate and well-being	Co-operation between units and departments	cf., Lampikoski and Emden, 1999; Harbone and Johne, 2003; Wan et al., 2005; Dobni, 2008; van Hemert et al., 2013
	Encouragement to disagree	
	Encouragement to be multi-skilled	
	Work well-being of employees	
	Appreciation of employees	
Know-how development	Possibilities for education	cf., Lawson and Samson, 2001; Romijn and Albaladejo; 2002; Tidd et al., 2005; Freel, 2005; Wan et al., 2005; García-Morales et al., 2007; Hausman, 2005; Martínez-Román et al., 2011; Romero and Martínez-Román, 2012
	Support for voluntary learning and development	
	Investing in learning	
Regeneration	Activity towards new methods of action	cf., Lampikoski and Emden, 1999; Calantone et al., 2002; Wan et al., 2005; Bullinger et al., 2007
	Courage to try new ways of action	
	Allowance of mistakes	
External knowledge	Encouragement of gaining knowledge outside an organization	cf., Guzmán and Santos, 2001; Lawson and Samson, 2001; Neely et al., 2001; Romijn and Albaladejo, 2002; Day and Schoemaker, 2005; Hausman, 2005; Adams et al., 2006; Swink, 2006; Akman and Yilmaz, 2008; Kallio et al., 2012; Tomlinson and Fai, 2013
	Development by comparing to other organizations	
	Development with stakeholders	
Individual activity	Willingness to participate	cf., Amabile, 1997; Calantone et al., 2002; Wan et al., 2005; Dobni, 2008; Hotho and Champion, 2011; Martínez-Román et al., 2011; Kallio et al., 2012
	Adoption of new ways of action	
	Criticality towards current ways of action	

Participatory leadership culture refers to the leadership culture that supports innovation. It reflects the managers' role in the overall atmosphere of a firm that supports innovation and the manager's behavior that facilitates innovation. Important things are that managers give employees enough freedom regarding their tasks in order to enhance the employees' well-being and innovation capability. To foster innovation capability, managers also need to direct employees' energy in the right direction instead of giving orders and instructions. Managers need to show their support when it comes to good ideas by passing ideas forward (cf.,

Bullinger et al., 2007). Employees are more motivated to develop innovations if their contribution is appreciated. This kind of participative leadership boosts employees' commitment to developing innovation capability. A manager committed to learning for innovation seeks methods of transferring knowledge between employees.

Ideation and organizing structures means the structures and systems that successful innovation requires—both ideation structures and the ways in which the work is organized. Innovation capability requires support mechanisms enable generating and processing ideas. Also, a collaborative and open culture for feedback is necessary for the capability to perform innovation. Reward systems are good motivators and foster innovative behavior (Lawson and Samson, 2001). Employees need to have enough time to develop their innovation capability, which means that the work requirements need to be in line with the ambitions regarding innovation. In order to facilitate continuous learning for innovation, there need to be people responsible people who make sure that the requirements are fulfilled.

Work climate and well-being represent employee well-being and the work climate for performing innovation. An effective climate for innovation tolerates employees who think differently. Because employees' expertise and knowledge are needed to build a firm's innovation capability, it is important to create a favorable culture for innovation, which requires that the employees are treated equally (Dobni, 2008). It requires that employees are motivated and feel they are members of the work community. Innovation capability also benefits exchanging knowledge across firm boundaries.

Know-how development highlights that employee expertise plays an important role in developing a firm's innovation capability. Innovation capability requires not only employee expertise but continuing and stretching individual development (Tidd et al., 2005). It requires that employees who are interested in developing expertise in innovation are supported. Finally, to develop innovation capability, firms have to be committed to learning to create a facilitating culture to foster and sustain the firms' innovation capability.

Regeneration refers to the firm's ability to learn from earlier experience and use that experience to perform innovation and develop operations. Regeneration requires that established practices and beliefs may have to be challenged to develop innovation (Calantone et al., 2002). Innovation capability benefits from an atmosphere that encourages trying new ideas without fear of failure. A favorable renewal culture for innovation is tolerant of mistakes (Wan et al., 2005; Lampikoski and Emden, 1999).

External knowledge emphasizes the importance of exploiting external networks and knowledge for the firm's innovation capability. A firm's attitude toward obtaining knowledge outside the firm affects innovation capability. Its ability to collaborate externally is a key to the firm's innovation capability (cf., Swink, 2006), because interaction with stakeholders can provide information required to develop innovation capability that the firm itself cannot provide (Romijn and Albaladejo, 2002).

Individual activity expresses that employees' individual innovation capability and activity are needed to form a firm's innovation capability. In order to have high level of innovation, employees need to share the belief that innovation is important and be willing to exchange ideas (Wan et al., 2005). To continuously perform innovation, employees' behavior and actions need to adjust according to the changing business environment (Dobni, 2008). Also, to perform innovation employees need to have new perspectives on problems.

Based on publication I, it was concluded that the size of the organization and the industry did not have a significant effect on innovation capability and innovation performance measurement. The entirety of innovation performance measurement was at a poor level in comparison to the other issues studied. This can be explained by the intangible nature of innovation capability, which also appears as a difficulty in evaluation, and especially in measurement.

Answer to the research question

Innovation capability is a multi-faceted construct, including determinants with both internal and external focus as well as determinants of organizational issues and issues concerning the employees. Seven kinds of determinants of SME innovation capability can be identified: participatory leadership culture, ideation and organizing structures, work climate and well-being, know-how development, regeneration, external knowledge, and individual activity. There are no differences in the capability to perform innovation, although there might be differences in the innovation of the firms of different size and industry. In other words, firms with different size or industry do not have remarkable differences in organizational routines and processes affecting an organization's ability to perform innovation.

4.2.2 Performance effects of innovation capability

The sub-question 1b, *What are the effects of innovation capability on performance in SMEs?* was examined in publication II—*The role of innovation capability in achieving higher performance.*

Publication II

BACKGROUND AND OBJECTIVE

The objective of publication II was to study the relationship between innovation capability and performance. As presented in the methodology chapter, perceived innovation capability and perceived performance were studied as subjective items. Previous studies have studied the relationship between innovation, often measured through numeric values, for example the number of innovations generated, and performance (c.f., Akgün et al., 2009; Jiménez-Jiménez and Sanz-Valle, 2011). In addition, a majority of these studies has concentrated on large firms and relationship between their innovation and performance. Publication II goes one step further by studying the determinants of innovation capability and their effect on performance. Publication II contributes to the current understanding by presenting the important determinants of SME innovation capability that have a direct effect on firm performance.

MAIN FINDINGS

The results reveal the importance of developing innovation capability for achieving higher performance. The findings show that three determinants of innovation capability, namely ideation and organizing structures, participatory leadership culture, and know-how development, have an effect on perceived performance. Further, the study identified the determinants of innovation capability that are most influential in perceived performance on the perspectives of management and employees.

According to the results of the study, ideation and organizing structures are positively related to perceived performance. However, the effect of ideation and organizing structures was notable only from the perspective of managers. The employees did not consider them influential. This is in line with the study by Jiménez-Jiménez and Sanz-Valle (2011) which showed that organizational routines that help firms to conduct their activities more efficiently and, therefore, obtain better performance. When the structures and ways of working function well, employees have time to concentrate on completing their tasks.

Another determinant that has an effect on firm perceived performance is a participatory leadership culture. This effect was significant only in the perspective of managers. A previous study by Zhu et al. (2005) concluded that leadership is one of the key driving forces for improving firm performance. However, in this study the effect was found to be negative between a participatory leadership culture and perceived performance. If the managers of SMEs, which usually have low organizational hierarchy levels, concentrate too much on the operative level actions, they may ignore their primary task: management of the firm. On the other hand, tight participation of the managers in operational activities may decrease employee idea generation and creativity. These two reasons may thus explain the negative relationship between a participatory leadership culture and performance from the perspective of managers. Also, the perception may be caused by managers' personalities, formal structures, or organizational cultures that do not favor participation.

Thus, it can be suggested that for improving performance, managers should find a balance between participation in daily routines and managing the firm. This is especially important since employees did not perceive a negative relationship between participatory leadership culture and firm performance. Employees need some participation from the managers to guide their daily work. Despite participating in daily routines to some extent, leaders should not neglect their management duties. This means that management should organize work in a way that releases employees from extra pressure concerning ways of working. It means that managers should not get too tied up in daily routines, as it can result in neglecting their main task, which is managing the firm in relation to its strategic objectives. This conclusion is also supported by the results of this study.

Know-how development was also found to be positively associated with perceived performance. This positive relationship was found to be significant only from the perspective of employees. The previous studies by Schroeder et al. (2002) and Aragón-Correa et al. (2007) showed that collective knowledge acquisition, knowledge sharing, and knowledge utilization positively affect performance. Employees seem to appreciate the possibility of educating themselves. In many industries, the firm is as competitive as its employees are, as all relevant knowledge is tacit and knowledge is retired the firm when the employees retire. Thus, know-how development is considered important for perceived performance from the perspective of employees. From the perspective of management, the relationship between know-how development and perceived performance was not found to be influential. This may be a consequence of the fact that it is usually suggested that to achieve high performance a firm should develop its operations to adjust to the rapidly changing environment. On the basis

of management responses, performance is improved by developing operations. This is in line with the result that indicated that ideation and organizing structures are positively related to perceived performance.

Some determinants of innovation capability have a direct relationship with a firm's perceived performance. To achieve higher perceived performance, firms should develop these determinants. Although there is a variety of studies confirming the positive effect of innovation on performance (e.g., Cainelli et al., 2004; Jiménez-Jiménez and Sanz-Valle, 2011), the determinants that foster firm innovation do not necessarily lead to higher performance directly. For example, the study by Armbruster et al. (2008) shows that organizational innovations act as prerequisites and facilitators of an efficient use of technical product and process innovations, and therefore they are sources of performance. Organizational innovations themselves have an effect on productivity, lead times, quality, and flexibility (Armbruster et al., 2008).

There are also four determinants of innovation capability that were not found to be influential when achieving higher performance. One plausible reason for this is that the relationship between innovation capability and performance is more complex than expected according to initial theoretical development. The results do not mean that these four determinants do not have value when enhancing performance; the value of these other four determinants on performance might be realized through other determinants or in other firm-specific contexts. Plenty of other predictors that affect performance rather than innovation capability could be found (e.g., competition situation, business cycle). Based on the results, it seems that innovation capability is not enough alone if the organization lacks the ability to utilize practical tools and concrete methods to realize this capability. The capabilities may also be linked to the process of innovation, having thus an indirect and long lasting effect on performance.

Answer to the research question

All in all, the results show a connection between innovation capability and perceived performance. Three determinants of innovation capability, namely ideation and organizing structures, participatory leadership culture, and know-how development, are most significant. From the perspective of management, ideation and organizing structures are most influential when achieving higher performance. However, managers considered that participatory leadership culture negatively affects perceived performance. Regarding the responses from employees, the only determinant of innovation capability that had a positive effect on

perceived performance was know-how development. As a whole, ideation and organizing structures seemed to be most influential when looking at the big picture of overall perceived performance. There are also four determinants of innovation capability that had not direct relationship with perceived performance. It seems to be obvious that innovation capability is not enough alone if the organization lacks the ability to utilize practical tools and concrete methods to realize this capability. A lot of effort and resources may have been harnessed in developing innovation capability, but the benefits have not been realized due to the lack of appropriate methods.

4.3 Role of performance measurement in SME innovation capability

4.3.1 Effects of performance measurement on innovation capability

The sub-question 2a *What are the effects of performance measurement on innovation capability of SMEs?* is addressed in publication III—*Facilitating innovation capability through performance measurement: A study of Finnish SMEs*, and in publication IV—The *relationship between innovation capability and performance: the moderating effect of measurement*.

Publications III and IV

BACKGROUND AND OBJECTIVES

The objective of publication III was to study the relationship between performance measurement and innovation capability. In order to manage innovation capability, it has to be measured. Previous research has concluded that performance measurement can have a positive effect on many things if the measurement is conducted in the right way (c.f., Lawson et al., 2003; Pavlov and Bourne, 2011). Traditionally, SMEs have few resources to measure their performance or issues related to innovation capability. However, performance measurement is important for innovation capability, because it can provide clarity in the process of developing innovation capability. Although, the positive effects of performance measurement have been studied, the effects on innovation capability still remain unknown.

The objective of publication IV was to study whether the relationship between innovation capability and perceived performance is moderated by performance measurement. Previous research has studied the effects of performance measurement, but not in the area of innovation capability. Previous research has also shown that performance measurement has positive

effects on issues closely related to innovation capability (Bisbe and Otley, 2004; Henri, 2006b; Groen et al., 2012). The results of publication IV go one step further by showing the effects of performance measurement on the relationship of multiple determinants of innovation capability and perceived performance.

MAIN FINDINGS

The results of publication III show that performance measurement is significantly and positively related to different determinants of innovation capability. The analyses were conducted on each innovation capability determinant, and the results of the analyses show that performance measurement has the strongest effect on ideation and organizing structures and know-how development. However, the significance is strong in all determinants of innovation capability.

The findings contribute to current theories by indicating that all the seven determinants of innovation capability are connected to the state of performance measurement. This is in line with the major stream of the studies on the positive effects of performance measurement. For example, studies by Grafton et al. (2010) and Pavlov and Bourne (2011) indicate a positive relationship between performance measurement and some factors closely related to innovation capability. Because the relationship between performance measurement and innovation capability is positive and significant, innovation capability can be enhanced by measuring it. As such, publication III highlights that organizations should pay attention to the development of innovation performance measurement concerning issues related to innovation capability. When performance measurement and innovation capability are positively connected, innovation performance measurement can be designed for firms to benefit from their innovation capability.

According to the results of publication IV, the effect of exploitation of external knowledge is most significant when investigating the moderating effect of performance measurement on the relationship between the determinants of innovation capability and perceived performance. The results thus show that exploitation of external knowledge has a negative and significant effect on perceived performance, whereas the effect is significant and positive when it is moderated by performance measurement. When the multiplicative items were entered in regression one by one, none of the determinants alone was significant, but the determinants of innovation capability together with performance measurement had an effect on perceived performance. The hypotheses propose a moderating effect of performance measurement on the relationship between innovation capability and perceived performance considering the

external knowledge determinant. Consistent with the predictions, this link between the determinant of innovation capability and perceived performance was indeed strong in the presence of performance measurement. Instead of focusing purely on the internal determinants of innovation capability, the behavior of exploiting external knowledge seems to have a most significant positive effect on perceived performance when moderated by performance measurement. In earlier literature, the organization's ability to acquire outside knowledge and to collaborate externally has been stated to be a key to its innovation development (c.f., Swink, 2006).

When focusing on the six other, internal determinants of innovation capability, the significant moderating effect of performance measurement on perceived performance does not exist. The nature of these determinants is more multiform in comparison, for example benchmarking the best practices and the development results of these determinants usually occur gradually. Performance measurement, even when sophisticated, does not intrinsically guarantee a direct effect on perceived performance. The results thus indicate that if performance measurement is focused on only the determinants of innovation capability, the relationship with perceived performance is mainly non-existent. As performance measurement always has consequences on the environment in which it operates (Bourne et al., 2003), innovation performance measurement should take into account a variety of issues that link the individual determinants of innovation capability to each other. In this way, the mechanism of how innovation performance measurement benefits perceived performance can be clarified.

However, the results of publication IV indicated that without the moderating effect of performance measurement the effect of the exploitation of external knowledge for perceived performance is negative. It can thus be stated that the challenges of exploiting external knowledge can be mastered through performance measurement somewhat. When the exploitation of external knowledge becomes more systematic and monitored, external knowledge may become more beneficial for the firm when achieving better performance. In turn, it seems that when performance measurement does not exist, attempts to utilize external knowledge and best practices are ineffective without a clear focus and target or the ability to channel the resources to appropriate targets.

Answer to the research question

Based on the results of the publications, it can be concluded that SMEs can somewhat affect their innovation capability through performance measurement. Performance measurement is positively connected on all seven determinants of innovation capability. Performance

measurement also acts as an important moderating link in the innovation capability–perceived performance relationship, because performance measurement partly moderates the innovation capability–perceived performance relationship. Firms that measure the determinants of innovation capability, especially through active exploitation of external knowledge, are more likely to engage in a higher level of innovation capability, which in turn has a positive effect on their performance. Performance measurement can thus be used as a tool for improving SME performance through innovation capability. Performance measurement can assist SMEs in developing their innovation capability and in reaching their performance and business goals. Finally, the results indicate that instead of focusing purely on internal focus determinants, external focus determinants seem to also have a positive effect on perceived performance when moderated by performance measurement.

4.3.2 Performance measurement of innovation capability

In the sub-question 2b, *How can the relationship between innovation capability and performance be measured?* was examined. This issue was mainly examined in publication V—*A conceptual framework for the measurement of innovation capability and its effects*.

Publication V

BACKGROUND AND OBJECTIVE

The objective of publication V was to present a framework for innovation performance measurement. It is also clarified how innovation measures should be linked to actual performance measures and be part of innovation performance measurement. There is a common agreement that performance measurement is not contradictory within innovation (Neely, 2000). However, the current approaches and frameworks do not give instructions on how SMEs in particular can develop their innovation capability. There have also been few attempts at using a performance measurement approach to generate a framework of the development of innovation capability within SMEs. However, SMEs could benefit from innovation performance measurement when improving their innovation capability. Performance measurement is today seen as a comprehensive process, which means that all things happening in the organization are considered to have an effect on the performance of the organization. Thus, innovation performance measurement can rather be used as a tool for developing innovation capability.

MAIN FINDINGS

The nature of innovation capability as a future oriented and mainly intangible construct leads to a situation where innovation capability cannot usually be measured directly. Innovation measures have to be designed so that they also measure things closely related to innovation capability, meaning the determinants of innovation capability. They can be measured by objective or subjective measures, or both.

The most important objectives of innovation capability depend on firm-specific contextual factors, such as size and industry. There are also enabling factors without which firms will not be able to innovate (Laforet, 2011). These include, for example, financial resources and workforce. Also, vision and strategy that support innovation capability and its development may act either as enablers or obstacles of innovation capability. These things are prerequisites that have to be taken into account when developing innovation capability, although they are difficult to change.

Innovation capability may not be a homogenous collection of factors, but different kinds of innovations (Francis and Bessant, 2005) and different kinds of firms (Silva et al., 2012; Kallio et al., 2012) may require utilizing and developing different determinants. One determinant can affect a range of other determinants. A firm can develop and affect the determinants through its own behavior. Although the determinants do not follow each other in a certain order, it is probable that certain determinants should be developed before others. Smith et al. (2008) discussed how organizational culture is a factor that affects all others and is itself also affected by changes in the other factors. In the present research, the work climate and well-being and leadership culture are regarded as those that should be improved first. After that, developing the other determinants is more likely to lead to success.

In addition to the determinants of innovation capability, their effects—innovations—have to be measured. These innovation measures can be linked to performance measures. The basic idea of innovation performance measurement is that innovation measures are linked into performance measures, because it is not enough to get the output of innovation—also the outcome of innovation is needed. Because innovation capability is expected to affect operational performance and in the long run also financial performance, innovation measures and performance measures need to be linked to each other. This means formulating causal linkages between innovation measures and SME performance measures. These causal linkages can help SMEs to follow how the development of innovation capability assists their

attempts to achieve performance goals. If the state of the measure (concentrating on development of innovation capability) changes, changes are also expected in the performance measure. This cause-effect relationship can be either direct or indirect, meaning that improvement in the innovation measure can be seen directly in some specific performance measures or indirectly through another measure.

Innovation measures cannot be the same in every case, because innovation capability also varies between different types of organizations. As Neely et al. (2000, p. 1120) argued, performance measurement frameworks often fail to account for the diversity and requirements within individual organizations. To avoid this, they suggest that the frameworks should be "a set of design guidelines designed to inform the development of a process for performance measurement system design." Thus, the objectives and their performance measures are case-specific, and goals are set considering the organization's starting points and characteristics.

Previous research has presented many positive effects of performance measurement. As pointed out by Neely et al. (2000), performance measurement must not be seen as obtrusive and contradictory within innovation. When performance measurement has been conducted in a proper way, it can boost innovation capability. Especially in the context of innovation, innovation measures should be dynamic and changeable, and continually reviewed and developed during the transitional process of developing innovation capability (Neely et al., 2000; McAdam and Keogh, 2004). It is also emphasized that measuring innovation capability must be given more strategic and operational importance and a wide range of measures should be adopted, reflecting the diversity within innovation capability (McAdam and Keogh, 2004). In this way, innovation measures can be used as a management tool in the everyday context when aiming to guide and direct innovation capability as part of the firm strategy.

Innovation performance measurement is thus important for increasing the competitiveness of SMEs through innovation capability (McAdam and Keogh, 2004). Innovation performance measurement should be systematic to enable the development of innovation capability and to be able to make proper decisions based on measurement information. Neely (2005) stated that organizational focus should be redirected from performance measurement to performance management. Similarly, as regards innovation performance measurement, the focus should be on evaluating and reacting to the changes in innovation performance measurement information in a way that performance improvement is possible. The problem of current innovation performance measurement is the lack of measurement where innovation measures are aligned with each other and with the firm strategy (Adams et al., 2006). Innovation performance measurement is needed along multiple levels and phases. Thus, measurement

should be realized in each phase of the process of turning capability into a firm asset. Innovation measures should be complementary to each other. Innovation capability, as well as its enablers, should have their own measures that are linked to each other.

Answer to the research question

As SME innovation capability cannot usually be measured directly, innovation measures have to be designed so that they measure the determinants of innovation capability. As regards innovation performance measurement, the focus should be on evaluating and reacting to the changes in innovation performance measurement information in a way that performance improvement is possible. The innovation performance measurement should be systematic to enable the development of innovation capability and to be able to make proper decisions based on measurement information. Innovation performance measurement is needed along multiple levels and phases. Thus, measurement should be realized in each phase of the process of turning innovation capability into better performance. Finally, innovation measures and performance measures need to be linked to each other to cover relevant aspects of innovation performance measurement. This means formulating causal linkages between innovation measures and SME performance measures.

5 CONCLUSIONS

This chapter presents overall conclusions of the research in terms of theoretical and managerial implications. The main aim in the research was to identify how to manage performance through measuring and managing innovation capability. Derived from the results of the individual publications and the synthesized understanding gained during the research process, the research suggests that performance measurement and management play an important role in developing SME performance through innovation capability. The study makes three main contributions: First, it gives empirical evidence of what the effects of innovation capability on SME performance are, and identifies the determinants that influence it. Second, it illustrates the effects of performance measurement on innovation capability. Thirdly, it clarifies how to measure the relationship between innovation capability and performance.

5.1 Theoretical implications

This research has connected innovation management research with performance management research. The theoretical ground of the thesis was mainly built on the literature concerning SME innovation capability, the relationship between innovation capability and performance, and innovation performance measurement. The theoretical contribution of the research consists of integrating performance management and innovation management, while mainly contributing to performance management. The research provides the following insights into performance management literature.

Firstly, the research clarifies the effect of performance measurement in developing innovation capability. Performance measurement is connected to the state of innovation capability in SMEs. Performance measurement affects positively on all seven determinants of innovation capability. The relationship between innovation capability and performance measurement is challenging, but the results of the study provide a good starting point for in-depth studies of the subject. Firms that measure the determinants of innovation capability, especially through active exploitation of external knowledge, are more likely to engage in a higher level of innovation capability, which in turn has a positive effect on their performance. Performance measurement can thus be used as a tool for improving SME performance through innovation capability.

Secondly, this research clarifies how to measure the relationship between innovation capability and performance. Current literature has presented various measures of innovation,

but often fails to account for the diversity and requirements within individual organizations. There is a lack of attempts in the current literature to provide frameworks for improving innovation capability through performance measurement, at least for SMEs. The results of this research contribute to innovation performance measurement by providing information to clarify the development of a process for innovation performance measurement concentrating on innovation capability.

Thirdly, the research signifies the relationship between innovation capability and performance in SMEs by showing that innovation capability and performance are connected. Importantly, this study extends previous research that has either focused on large firms or separately examined innovation capability. Previous research has concentrated on studying the effects of different types of innovation and firm performance. This study goes a step further by studying the effects of a firm's capability to perform innovation on its perceived performance. In addition, despite the literature suggesting a positive relationship between innovation and performance, so far no much research has analyzed the relationship by taking into account the various determinants of innovation capability in a single model. The findings highlight that some SMEs might perform better than others and this might not rest totally on how well they develop and deploy a specific individual determinant of innovation capability. There are multiple determinants of innovation capability that matter for perceptions of performance. Determinants are complementary to each other and firms should develop these determinants simultaneously.

Fourthly, the research contributes to the current literature by providing a holistic definition of innovation capability, while the majority of existing research focuses on limited determinants of innovation capability. The study thus develops the fragmented literature of innovation capability by presenting a more holistic approach to innovation capability. Seven determinants of innovation capability have been defined. Also, in performance management literature, the concept of innovation is often seen very concisely. Innovation capability is a broad concept, and should cover the entire range of different determinants. The definition presented in this research provides a good starting point for studying the determinants of SME innovation capability.

5.2 Managerial implications

The research has a principal focus on contributing to theory development. Thus, the practical concreteness of the findings may be limited. This research discusses the benefits of using performance measurement for developing innovation capability. In addition, the research

offers practical implications in how to utilize innovation capability and its measurement in enhancing performance in the SME context. The main managerial implications of the research are as follows.

Firstly, the results clarify the important determinants of innovation capability. Concentrating on developing these determinants can help managers in concentrating development efforts on the right issues. Thus, the research increases understanding that innovation capability consists of various determinants, which are more easily measurable and manageable than the whole phenomenon. For SMEs, it is important to develop their innovation capability, because at best, it can affect performance. Mechanisms and processes are needed to exploit the innovation capability.

Secondly, the results provide managers with a practical implication when aiming to build higher performance. SMEs must pay attention to developing the key determinants of innovation capability. Due to the nonexistent relationship between some determinants of innovation capability and performance, a good state of innovation capability is not enough if there are no proper practices and mechanisms for exploiting the capability. The results of the study raise the idea that the relationship between innovation capability and performance is not linear. Moreover, it can be assumed that there is an iterative cycle between innovation capability and performance. They improve each other when attention is paid to the right issues.

Thirdly, the results of this research also highlight the applicability of performance measurement in developing and managing innovation capability. This study has shown that organizations can affect their innovation capability by performance measurement. The research suggests that practitioners should focus on the development of new methods and practices for measuring issues related to innovation capability. Managers can exploit the implications of innovation performance measurement when developing the firm’s innovation capability through performance measurement.

5.3 Limitations

There are limitations of this research that should be acknowledged. The research was conducted in the context of SMEs. The results are not generalizable for large firms. Also, micro firms were excluded from the sample and thus the results cannot be generalized to micro firms. Finnish SMEs employing 10–249 persons and with a revenue of 2–50 million euros were the target of the study. The representativeness of the data could be questioned, as

only 311 responses were received. The data does not exactly represent the division of Finnish SMEs, within the stated range. Medium-sized firms are somewhat over-represented in the sample. However, the possible consequences of this kind of issue were reduced by following exact procedural and statistical remedies. The responses were received from different types of SMEs, which was crucial to make the comparisons between different kinds of SMEs possible. Also, the initial sample of 2,400 SMEs represented over 10 percent of the total number of SMEs that meet the revenue and employee ranges. On a practical restriction, the sample had to be selected from among 8,214 firms. When considering these issues, it can be assumed that the results reflect the whole sample quite well. The results can thus be somewhat generalized to SMEs, with the previously mentioned restrictions, at least in Finland.

Another limitation is that the research is based on data from a single country. Specific country characteristics should be taken into account when the results are applied to practice or in further studies.

This research is cross-sectional in nature, which is a possible limitation of the research method employed. When collecting data, the firms were asked to evaluate their performance over a three- to five-year timeframe. Thus, the scores were deemed as a reliable assessment of actual performance. The data used in the study were collected with subjective measures based on the perceptions of firms' managers and employees. The use of perceptual data is another limitation of the research. Errors caused by using this type of data are possible when a single response from a firm is received. Although perceptual data is extensively used in business studies, there is a possibility that the subjectivity of the measures has biased the results of the study. This limitation was attempted to be tempered by paying attention to theoretical arguments rationalizing the analyzed relationships. Although perceptual data may introduce limitations, it has been found that measures of perceived performance correlate positively with objective measures (see e.g., Venkatraman and Ramanujan, 1987). Thus, this implies that using perceived performance as a measure of firm performance can provide a real signal of actual performance. When it comes to the state of innovation capability, formal procedures and policies do not always reflect the actual state of innovation capability. More important is the reality of what management and employees perceive and experience on a daily basis. Because of the nature of studied issues, perceptual data was seen as the most appropriate to get truthful views of the studied issues concerning innovation capability. Although many remedies were used to reduce the possibilities of uninformed responses, this could have biased the results.

In addition, a majority of the responses came from managers. Thus, managers' opinions are emphasized in the results. This highlights the limitation of the low response rate of employee respondents. This may be due to the fact that the topic of the research might have seemed challenging for employees. Innovation capability, performance measurement, and performance are all complex issues, which could have reduced employee response rate. This kind of failure to reply was attempted to be avoided by careful construction of both the cover letter and the survey itself. The employees were given the chance to bypass an item if they did not have enough information to respond. In addition, non-response bias was checked in the employee responses and did not present a problem. However, due to the low response rate, the results should thus be handled circumspectly.

There are also some limitations of the analyses used. According to Hair et al. (2006), the size of the sample has a direct effect on the appropriateness and statistical power of regression analyses. The size of 311, from which most of the analyses were conducted is sufficient. However, there were only 80 responses from the employees, which could be considered as being borderline in acceptable size. No too strict conclusions should be made from the results. The results considering employees perceptions on the relationship between innovation capability and performance should be handled circumspectly. In factor analysis, conducted on the whole sample, a limit of 100 responses is common (e.g., Hair et al., 2006).

This research has also concentrated on investigating SME internal factors, not external, e.g., market factors. However, focusing on the internal level was a conscious scope-related decision, which helped in focusing on a specific level of analysis. Recommendations as stated above must be viewed in the light of these limitations. Further studies are required to validate the findings of this study with a larger sample and in different contexts to reach firmer conclusions.

5.4 Suggestions for further research

This research contains some interesting findings that would provide a good starting point for further studies. Firstly, as this research has been mainly quantitative and conceptual, it to be complemented by qualitative research aiming to provide an insight into SMEs' innovation capability. In-depth research is needed to study the tools and methods to assist the realization of innovation capability. Since firm size and industry do not seem to comprehensively explain the differences in the determinants of innovation capability in SMEs, when pursuing better innovation capability in the future it is beneficial to study the predictors that affect a firm's

exploitation of the innovation capability. These issues can be tackled, for example, with in-depth case studies to achieve a deeper understanding of the mechanisms involved.

Secondly, further qualitative studies are needed to formulate measures for both determinants of innovation capability and firm performance so that the causal relationships can be identified. It has been concluded that the consequences of performance measurement depend on the way it is used. The present research does not provide measures for developing innovation capability, nor does not clarify what type of measurement or the way measurement is used is most beneficial. Therefore, more research is needed to capture the linkage between innovation capability and performance measurement in detail. Further research should concentrate on developing innovation measures that assist in this task. Another subject for future research is an empirical examination of the relationships between the determinants of innovation capability. This work would also assist the measurement of the determinants.

Thirdly, there were four determinants of innovation capability that were not found to have a direct relationship with firm performance. Thus, there may be other factors that moderate or mediate the relationship. Further studies should identify these factors, so that the path from the determinants of innovation capability and firm performance could be defined more exactly.

Fourthly, the relationship between a participatory leadership culture and perceived performance was found to be negative. This result is somewhat contrary to previous research; thus, the issue needs more research. This could be studied by addressing issues such as whether participatory leadership culture is associated with cost reduction, profit, or turnover, and whether it is associated with growth. In this way, the mechanisms between the unexpected results could be tracked.

Fifthly, it is not clear whether, and to what extent, each of the innovation capability determinants correlate with each of the overall performance constructs (productivity, profitability, etc.). This should also be a subject of future studies. This study suggests a signal of the existence of the relationship between innovation capability and perceived performance. Therefore, the findings of our study point out the need for more extensive research on the innovation capability-performance relationship counting for the mediating role of organizational attributes and processes. In this way, a more precisely defined linkage between these two issues could be formulated in the future.

Sixthly, in-depth studies are needed to clarify how the SMEs use the performance measurement to manage performance through external knowledge. Regarding the other determinants of innovation capability, it would be interesting to discover whether the innovation performance measurement is focused more on the single determinants or on the process that transfers the innovation capability to firm performance. The presumption for further research could be that performance measurement can have positive effects when conducted in a way that concurrently takes into account the determinants, process, outputs, and performance implications of innovation capability. In this way, innovation performance measurement could be considered a useful link for SMEs in their attempts to manage such a multifaceted construct as innovation capability, in order to achieve higher performance.

Finally, due to the limitation associated with the used data, further research should validate the results in smaller sample of SMEs. This could be conducted, for example, by concentrating on small firms with 10-49 employees and by scraping an increased number of responses. The representativeness of the data could be justified more closely. Also, the accuracy of the differences between the perceptions of management and the employees could be validated with an increased number of responses.

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APPENDIX: SURVEY ITEMS

Part 1: Background information

1. Revenue (Meuro) (2-5, 5-20, 20-50)
2. No of employees (10-49, 50-249)
3. Industry (Industrial, Service)
4. Location (Southern Finland, Western Finland, Eastern Finland, Northern Finland)
5. Organizational position (Executive, White-collar worker, Blue-collar worker)

Part 2: Innovation capability

1. My work community encourages gaining knowledge through external contacts
2. We have developed our ways of action by comparing our operations to other organizations
3. We develop our actions together with our stakeholders (customers etc.)
4. Co-operation works well in our organization
5. We have a clear way of processing and developing ideas
6. The employees get feedback for their ideas
7. Our reward system encourages ideating
8. Our organization seeks new ways of action actively
9. Our organization has the courage to try new ways of action
10. When experimenting with new ways of action, mistakes are allowed
11. The employees have the courage to disagree
12. The managers encourage initiatives
13. The managers give positive feedback
14. The managers pass employees' ideas to the upper levels of the organization
15. The managers participate in ideation and development
16. The employees are willing to participate in development
17. It is easy for the employees to adopt new ways of action
18. The employees know how to be critical towards current ways of action when needed
19. All employees have a possibility for education
20. We have instructions and responsible persons for work orientation
21. The employees are encouraged to be multi-skilled
22. Voluntary learning and development of expertise are supported in our organization
23. There are practices for transferring tacit knowledge
24. In our organization, learning is an investment, not an expense

25. The employees prosper in our organization
26. The employees are treated equally
27. The employees are appreciated for their work
28. The number of working tasks is suitable
29. The quality, demands and responsibility of tasks are suitable
30. There is an opportunity for flexible working and working hours in our organization

Part 3: Performance measurement

1. Our organization has measures for evaluating development
2. Exploitation of external (customers, competitors etc.) knowledge is evaluated or measured in our organization
3. The functionality of internal processes is evaluated or measured in our organization
4. The development of ways of action is evaluated or measured in our organization
5. Leadership practices are evaluated or measured in our organization
6. The employees' ideas are evaluated or measured in our organization
7. The employees' work wellbeing is evaluated or measured in our organization
8. The employees' expertise is evaluated or measured in our organization
9. The measurement information is used for developing the actions and operations of our organization

Part 4: Performance

1. Your firm's financial performance within the past three years
2. Your firm's operational (productivity, quality etc.) performance within the past three years

PART II: PUBLICATIONS

PUBLICATION I:

Saunila, M., Ukko, J. and Rantanen, H. (2012)

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Chapter 21
Innovation Capability and Its Measurement in Finnish SMEs

Minna Saunila, Juhani Ukko, and Hannu Rantanen

Abstract The importance of the development of an organisation's innovation capability for its success is highlighted in current literature. This study provides a comprehensive description of the status quo of Finnish SMEs regarding the different dimensions of innovation capability, expertise, work wellbeing, and the measurement of issues related to innovation capability. The study also clarifies whether the results of the studied issues differ depending on the size of the organisation, the industry and the organisational position. The most important insight of the study is that the perceptions of executives and employees differ significantly with regard to all the studied aspects. The study suggests that both academics and practitioners should focus on the development of new methods and practices for enhancing innovation capability, and especially the measurement of issues related to it.

21.1 Introduction

The valuation of innovations has increased in small and medium-sized enterprises (SMEs). Today, innovations are mainly created in practical contexts, where many different sources of information are exploited in solution-centred processes (Harmaakorpi and Melkas 2008). Many innovation systems are about to change from a Science, Technology and Innovation (STI) mode towards a Doing, Using and Interacting (DUI) mode. STI is a mode of innovation that focuses on codified knowledge and science-based learning. DUI is a mode of innovation where the focus is on tacit knowledge, organisational learning and user needs (Berg Jensen et al. 2007). The DUI mode requires a new kind of innovation culture for an organisation, implying abilities of producing innovations by everyday work.

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Innovation is viewed as an evolutionary process within an organisation to adopt any change pertaining to a device, system, process, policy, or service that is new to the organisation (Calantone et al. 2002). Thus, innovation can be regarded as an organisational capability because it is an act that deploys resources with a new ability to create value (Yang et al. 2009). Developing this innovation capability is important, as innovation plays a key role in the survival and growth of organisations (Francis and Bessant 2005). In order to manage innovation capability, it has to be measured. The importance of measurement is especially true for innovations where there is need to bring clarity to a fundamentally creative process (Skarzynski and Gibson 2008).

The purpose of this study is to provide a comprehensive description of the status quo of Finnish SMEs regarding the different dimensions of innovation capability, expertise, work wellbeing and the measurement of issues related to innovation capability. The study also clarifies whether the results of the studied issues differ depending on the size of the organisation, the industry and the organisational position. The study shows that the most significant differences can be found between the executives and the employees. The study also contributes to issues around innovation capabilities that academics and practitioners should focus on in the future.

21.2 Innovation Capability

The successful operation of organisations in almost all industries is becoming highly dependent on their ability to produce innovations (Tidd et al. 2005). The current literature presents many classifications for innovation (see, for example, Wan et al. 2005), and some of them are presented below. There are two key aspects of innovation: the degree of innovation and the scope of innovation. The degree of innovation is divided into radical and incremental innovation. The scope of innovation capability consists of technical innovation and administrative innovation (Lin et al. 2010). Innovation is a dynamic capability (i.e., a capability which allows the organisation to integrate, build, and reconfigure internal and external competences to address rapidly changing environments; Teece et al. 1997) with multiple dimensions (Sáenz et al. 2009; Lin et al. 2010). Therefore, the concept of innovation capability is intangible by nature. It cannot be measured directly but by evaluating dimensions closely related to innovation capability.

21.2.1 Dimensions of Innovation Capability

Several earlier studies have presented dimensions related to innovation capability. According to Lawson and Samson (2001), the elements making up an innovation capability are vision and strategy, harnessing the competence base, organisational

intelligence, creativity and idea management, organisational structure and systems, culture and climate, and management of technology. Skarzynski and Gibson (2008) divide innovation capability into four parts: leadership and organisation, people and skills, process and tools, and culture and values. The first part stresses that the leaders and organisation share a common vision of innovation. The second part includes a disciplined approach to building innovation capabilities across the organisation. The third part includes, for example, supporting tools to enable an idea generation pipeline and portfolio management. Innovation capability also requires a collaborative, open culture and incentives that reward challenging current actions, which forms the fourth part. Tura et al. (2008) define innovative capability through three subcategories: openness/creativity, knowledge/expertise, and operationalisation capability. The first subcategory comprises the capabilities needed to exceed the existing solutions and search for new possibilities. The second subcategory covers the capabilities to acquire the knowledge needed to build innovation. The third subcategory describes the capabilities to find and introduce applications, so that the organisation exploits the achievable knowledge base. Tidd et al. (2005) list the following components of an innovative organisation: shared vision, leadership and the will to innovate the appropriate structure, key individuals, effective team working, continuing and stretching individual development, extensive communication, high involvement in innovation, external focus, creative climate, and learning organisation. These different approaches and findings have been combined to a conceptual framework of dimensions of innovation capability developed by Paalanen et al. (2009) and further refined by the authors. In this study, innovation capability is divided into five dimensions. The dimensions are presented in Fig. 21.1 and discussed in detail below.

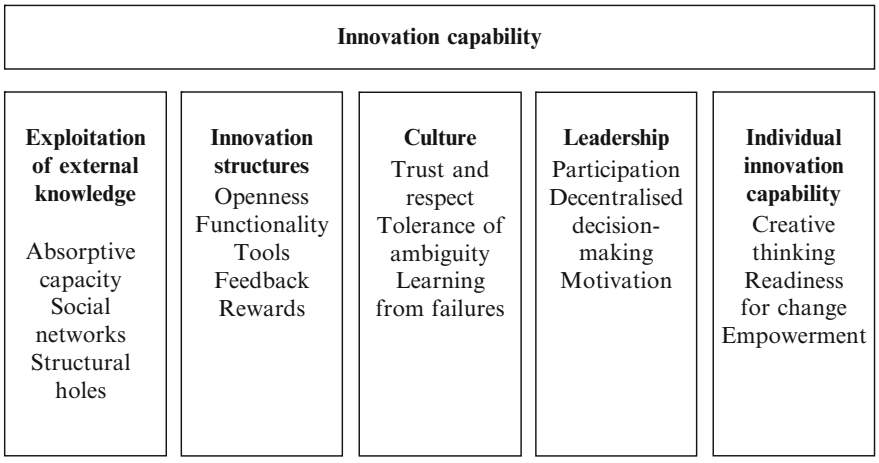

Fig. 21.1 Dimensions of innovation capability in the study (adapted on the basis of Paalanen et al. 2009)

21.2.1.1 Exploitation of External Knowledge

Absorptive capacity means the organisation's capacity to acquire and exploit new knowledge (Cohen and Levinthal 1990). According to Granovetter (2005), innovations are created in networks in social interaction of actors. Interaction with suppliers, customers, public assistance agencies, industry associations, foundations and the like can provide missing inputs into the learning process, which the firm itself cannot provide (Romijn and Albaladejo 2002; Lawson and Samson 2001). According to Panayides (2006), an organisation oriented towards a client relationship can enhance its innovation capability as it will become more creative in its methods of operation, will seek new ways for doing things and trying out new ideas, and will be the first to market with new products and services. People across organisations have more alternative ways of thinking. These structural holes give them more options to select between new ideas (Burt 2004).

21.2.1.2 Innovation Structures

There is a common agreement on the necessity of flexible structures for innovation (Dobni 2008; Nahapiet and Ghoshal 1998; Subramanian and Nilakanta 1996). According to Subramanian and Nilakanta (1996), decentralised and informal organisational structures facilitate innovations. They also propose that the flexibility and openness of structures help to encourage new idea generation. In the dynamic environment, the organisational structure will need to be more open than precisely defined, more emotionally-inclusive than rationally-inclusive, more interactive than integrative, more temporal, more flexible, and trust- and informality-based (Wang and Ahmed 2003). Communication channels facilitate knowledge sharing by exchanging experiences. It requires tight social dealings to transfer tacit knowledge (Nahapiet and Ghoshal 1998). Reward systems are powerful motivators and foster creative behaviour (Lawson and Samson 2001). Bringing innovation to every workstation requires practical tools, processes, and mechanisms that the employees can use day by day to turn innovation into the organisation's capability (Skarzynski and Gibson 2008).

21.2.1.3 Organisational Culture

Every organisation has its own culture, also known as style, character, or way of action. For organisations, culture is like personality for individuals. It is hard to change, but it can be developed. Innovative organisations tolerate ambiguity, but they do not take unnecessary risks (Lawson and Samson 2001). Organisations need to be tolerant of the mistakes that will occur and allow for recovery and learning from failures (Wan et al. 2005; Lawson and Samson 2001). Innovation is more likely in a situation where people attribute high levels of integrity, competence,

reliability, loyalty and openness to others, and view others as equals. Creating this environment requires the employees to understand their roles, and then develop their creative and independent sides further (Dobni 2008). Knowledge transfer requires tight social dealings. Social capital is situated in relationships between individuals (Nahapiet and Ghoshal 1998). Organisations with high innovation capability often have a learning-by-doing effect, which makes it hard for competitors to imitate and buy this know-how (Cavusgil et al. 2003). For employees to be motivated to innovate, there must be a culture that both supports and rewards innovation (Wan et al. 2005). Mutual trust and respect create an atmosphere that encourages individuals to try new ideas without fear of failure and its consequences (Lampikoski and Emden 1999; Wan et al. 2005).

21.2.1.4 Leadership

Building a successful, independent capability for innovation is basically a leadership challenge. Building an innovation infrastructure means breaking the boundaries that usually separate people, ideas and resources, and creating cross-boundary conversation and collaboration (Skarzynski and Gibson 2008). Today, leadership is seen as a skill to direct the employees' energy towards the right direction instead of giving orders and instructions (Lampikoski and Emden 1999). The management must strike a balance that allows employees to act on good ideas (Dobni 2008). A participative and consultative management style is crucial for innovation (Wan et al. 2005; Yukl 1998). The responsibility for innovation needs to be widened to the people who need it to complete their tasks and spread throughout the organisation's businesses and functions. Decentralisation allows quick action and flexibility (Wan et al. 2005). The managers' active investment in increasing the employees' possibilities to participate in the development of the organisation facilitates innovation capability (Lampikoski and Emden 1999). Participative leadership boosts the employees' trust, commitment and appreciation of the managers. They are also more motivated to do their tasks (Yukl 1998).

21.2.1.5 Individual Innovation Capability

According to Skarzynski and Gibson (2008), innovation is a skill that can be taught. For example, empowerment affects the execution of innovation, as it drives employees to go above and beyond what is normally expected of them (Yang and Choi 2009; Dobni 2008). Yang and Choi (2009) present four dimensions of empowerment: autonomy, responsibility, information, and creativity. Empowerment reflects the fact that the individual can affect the outcome of his work. So, as business realities change, the employee's behaviour and actions need to be adjusted accordingly. The very essence of innovation is to get the employees to think creatively, become adventurous, and take managed risks (Amabile 1997; Dobni 2008). Creative thinking includes the following points: the individual has new

perspectives on problems, is willing to take risks, and has tolerance for ambiguity (Amabile 1997).

21.2.2 Innovation Capability, Expertise and Work Wellbeing

Expertise is the senses, abilities and wills (=motivation) of individuals. Senses and abilities are not enough if there is no motivation to direct the expertise to action. Motivation is also connected to an individual's wellbeing and his/her experience as a member of the work community (Viitala 2005). The expertise of individuals, systems and ways of action, culture and atmosphere, and networks, contacts and partners form the expertise of a work community (Otala 2003). Physical and mental wellbeing are requisites of an individual's innovativeness. According to Salojärvi (2006), work wellbeing is formed by expertise, health, work community, and work environment.

Expertise, work wellbeing and the nature of the work community enable innovations (Salojärvi 2006). The factors that affect the development of the expertise of individuals to the capability of the organisation are very similar to the dimensions of innovation capability presented above: interaction, structures, patterns, systems, and leadership (Viitala 2005). If this resource crumbles, the same happens to innovation capability and thus the competitiveness of the organisation. Organisations have to pay attention to the work wellbeing and expertise of the employees, so that sufficient creativity and innovativeness can be guaranteed. Creativity and innovativeness are, after all, the only significant ways to survive in the global economy (Salojärvi 2006).

21.3 Measurement of Innovation Capability

It is obvious that improving the innovation capability is the key to acquiring sustainable competitive advantage for an organisation (Shan and Zhang 2009). According to Skarzynski and Gibson (2008), innovation measures can help managers in two ways:

- First, to make informed decisions based on objective data;
- Second, to help align goals and daily endeavours with the near- and long-term innovation agenda.

Thus, it is significant to evaluate the organisation's innovation capability accurately, and to find the key factors influencing the organisation's innovation capability (Shan and Zhang 2009).

Intangibles are hard to concretise, and that is why they are also hard to measure and manage (Bontis 2001; Kujansivu et al. 2007; Marr 2007). However, everything

is measurable. The real question is whether it is worth measuring, if the accuracy is not good enough and the measurement costs are higher than the attained advantages. When measuring intangible things, indirect measures are usually used. Indirect measurement is used when something cannot be measured directly. If the phenomenon itself cannot be measured, then something closely linked to the phenomenon has to be measured. Indirect measures can be divided into objective and subjective measures.

21.3.1 Objective Measurement of Innovation Capability

Generally, it seems that the current innovation capability measures can be divided into input measures and output measures. Input measures evaluate how the innovation activities have been arranged and how resources are allocated to them. Input measures include the funds used in R&D activities, new product development, and education (Skarzynski and Gibson 2008; Tura et al. 2008). Input measurement is problematic, because it tells how much is devoted, not if anything has been accomplished. Input measures also underestimate smaller innovation activities. Smaller organisations do not have opportunities to invest in R&D. That is why input measures do not reflect the actual innovation capability (Romijn and Albaladejo 2002).

Output measures evaluate the effects of innovation capability. It is hard to express all kinds of innovations quantitatively, and output measures usually measure the results of successful innovations (Tura et al. 2008). Output measures mainly include the organisation's patents and licenses. The problem of output measures is that they are only suitable for certain types of innovations and organisations. They are not suitable for small or service organisations (Romijn and Albaladejo 2002). Output measures do not measure the economic value of all kinds of innovations, either (Tura et al. 2008). All in all, the current type of measurement is especially difficult for practice-based innovation, resulting from the intangibility of the phenomenon.

There are some common characteristics in the current objective innovation capability measures. They are focused on industrial and technology innovations, and service innovations have no proper measures (Skarzynski and Gibson 2008; Tura et al. 2008). The current measures do not recognise, either, that organisations are of different sizes, and they operate in very different business areas (Carayannis and Provance 2008) or in the public sector. The best ones of the current measures are the ones which pay attention to both the inputs and outputs of innovation (Romijn and Albaladejo 2002). The input and output measures actually evaluate the innovation performance, and therefore also subjective measurement is needed to capture the overall innovation capability.

21.3.2 Subjective Measurement of Innovation Capability

Innovation capability has traditionally been measured via questionnaires or other subjective assessment models. There are various models for the measurement of innovation capability or factors closely related to innovation capability.

- Panayides (2006) has studied the antecedents and consequences of innovation capability of logistics service providers. He defines five antecedents of innovation capability: trust, bonding, communication, shared value, and empathy, including 18 items. The items are measured on a seven-point Likert scale.
- Dobni (2008) has created a procedure for the measurement of innovation culture (divided into innovation intention, innovation infrastructure, innovation influence, and innovation implementation) in organisations, which includes some of the dimensions of innovation capability presented above. The procedure includes 86 items applied with a seven-point Likert scale.
- Prajogo and Ahmed (2006) have studied human-based practices (namely leadership, people management, knowledge management, and creativity management) that provide innovation stimulus, and technology-based practices (namely technology management and R&D management), underpinning the capacity to innovate as part of their study of the relationship between innovation stimulus, innovation capacity, and innovation performance. The whole instrument includes eight scales consisting of 34 items and utilising a five-point Likert scale.
- Calantone (2002) have studied the learning orientation, composed of commitment to learning, shared vision, open-mindedness, intra-organisational knowledge sharing, and innovation capability. The construct includes four dimensions with 17 items of learning orientation measured by a seven-point Likert scale.
- Alegre and Chiva (2008) present an instrument concerning an organisation's learning capability. The instrument includes five dimensions (experimentation, risk taking, interaction with the external environment, dialogue, and participative decision making), measured by 14 items. The measurement scale is applied using a seven-point Likert scale.
- Bettencourt (2004) presents a questionnaire about change-oriented organisational citizenship behaviours. All constructs are measured with seven-point scales. The construct includes seven dimensions: core transformational leadership behaviour, contingent reward leadership behaviour, leader-member exchange quality, organisational commitment, learning goal orientation, performance goal orientation, and change-oriented organisational citizenship behaviours, measured by 40 items.

The previous studies do not take into account the measurement perspective, and do not capture the concept of innovation capability comprehensively. It is not enough to measure just one or two particular aspects of an organisation's innovation capability. This is especially true for practice-based innovation.

21.4 Research Methodology

This chapter presents a quantitative survey study conducted in Finland in spring 2010. The first objective of the study is to provide a comprehensive description of the status quo of Finnish SMEs concerning the different dimensions of innovation capability, expertise, work wellbeing and the measurement of issues related to innovation capability. The second objective is to clarify whether the results differ depending on the size of the organisation, the industry and the organisational position.

The survey data of the study were gathered from Finnish SMEs with a web-based questionnaire. SMEs with less than ten employees were excluded from the sample. In Finland, there are 8,214 SMEs employing 11–249 persons and having revenue less than 50 Meuro. A sample of 2,400 SMEs was randomly selected. A representative of both management and employees received an invitation to participate in this study. Thus, 4,800 questionnaires were sent. A total of 4,050 questionnaires reached the respondents, as 750 e-mail addresses were invalid.

The survey was conducted in four waves. One week after the first mailing of the survey, reminder questionnaires were sent out. This process resulted in a total of 311 responses, which equals the response rate of 7.68%. The background information of the respondents is presented in Table 21.1.

To create the research questions, a literature review was conducted. The data for eight variables were collected by the questionnaire: innovation capability (divided into exploitation of external knowledge, innovation structures, organisational culture, leadership, and individual innovation capability), expertise, work wellbeing and measurement. Each of these was operationalised through 3–9 research questions (originally in Finnish). The questionnaire was pre-tested by a small group of academics. This resulted in minor changes to the presentation of the questionnaire.

Each of the questions was measured by a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The data were analysed first with SPSS

Table 21.1 Background information of the respondents

		n	%
Revenue (Meuro)	2–5	141	45.3
	5–20	135	43.4
	20–50	35	11.3
No. of employees	10–49	224	72.0
	50–249	87	28.0
Industry	Industrial	145	46.6
	Service	159	51.1
	No response	7	2.3
Organisational position	Executive	222	71.4
	White-collar worker	68	21.9
	Blue-collar worker	12	3.9
	No response	9	2.9

software. The means and standard deviations for all the questions of eight variables were formed first. Second, comparison of the means was conducted by analysis of variance (ANOVA). The differences between the size of the organisations, different industries and different organisational positions were studied.

21.5 Description of the Data

In this section, a description of the entire data is presented by means and standard deviations. As regards the results of different dimensions of innovation capability presented in Table 21.2, it can be stated that the issues concerning the exploitation of external knowledge (means 3.75–4.13), culture (means 3.72–3.97), and leadership (means 3.6–4.02) seem to be on a satisfactory level. In the dimension of

Table 21.2 Means and standard deviations of the research questions

Research question	Mean	Std. dev.
Exploitation of external knowledge		
U1 My work community encourages gaining knowledge through external contacts	4.00	1.042
U2 We have developed our ways of action by comparing our operations to other organisations	3.75	0.985
U3 We develop our actions together with our stakeholders (customers etc.)	4.13	0.864
Innovation structures		
I1 Co-operation works well in our organisation	3.84	0.852
I2 We have a clear way of processing and developing ideas	3.32	1.032
I3 The employees get feedback for their ideas	3.82	0.828
I4 Our reward system encourages ideation	2.86	1.062
Culture		
K1 Our organisation actively seeks new ways of action	3.72	1.040
K2 Our organisation has the courage to try new ways of action	3.83	0.941
K3 When experimenting with new ways of action, mistakes are allowed	3.86	0.860
K4 The employees have the courage to disagree	3.97	0.820
Leadership		
J1 The managers encourage initiatives	3.72	0.912
J2 The managers give positive feedback	3.60	0.844
J3 The managers pass employees' ideas to the upper levels of the organisation	3.67	0.864
J4 The managers participate in ideation and development	4.02	0.781
Individual creativity and innovation capability		
L1 The employees are willing to participate in development	3.70	0.830
L2 It is easy for the employees to adopt new ways of action	3.12	0.959
L3 The employees know how to be critical towards current ways of action when needed	3.97	0.734

innovation structures, the mean for the question "we have a clear way of processing and developing ideas" was only 3.32, and for the question "our reward system encourages ideation" even lower, 2.86. This indicates that the innovation process is not clear in these Finnish SMEs, and they have failed in rewarding good ideas. With regard to the dimension of individual creativity and innovation capability, the question "it is easy for the employees to adopt new ways of action" had the lowest mean, 3.12.

The issues concerning the expertise presented in Table 21.3 seem to be on a satisfactory level in the Finnish SMEs, with the exception of the question "there are practices for transferring tacit knowledge". This question had the mean 3.12. Also the issues of work wellbeing seem to be on a satisfactory level. The only question in this dimension that was not considered as good was "the number of working tasks is suitable" with the mean 3.29. When focusing on the big picture of the measurement

Table 21.3 Means and standard deviations of the research questions (continued)

Research question	Mean	Std. dev.
Expertise (know-how)		
O1 All employees have a possibility for education	3.72	1.072
O2 We have instructions and responsible persons for work orientation	3.66	1.061
O3 The employees are encouraged to be multi-skilled	4.03	0.740
O4 Voluntary learning and development of expertise are supported in our organisation	3.78	0.881
O5 There are practices for transferring tacit knowledge	3.12	1.055
O6 In our organisation, learning is an investment, not an expense	3.80	0.924
Work wellbeing		
T1 The employees prosper in our organisation	4.00	0.687
T2 The employees are treated equally	3.87	0.915
T3 The employees are appreciated for their work	3.80	0.706
T4 The number of working tasks is suitable	3.29	1.015
T5 The quality, demands and responsibility of tasks are suitable	3.73	0.807
T6 There is an opportunity for flexible working and working hours in our organisation	3.89	1.053
Measurement		
M1 Our organisation has measures for evaluating development	2.89	1.088
M2 Exploitation of external (customers, competitors etc.) knowledge is evaluated or measured in our organisation	3.02	1.066
M3 The functionality of internal processes is evaluated or measured in our organisation	3.44	1.068
M4 The development of ways of action is evaluated or measured in our organisation	3.18	1.032
M5 Leadership practices are evaluated or measured in our organisation	2.85	1.078
M6 The employees' ideas are evaluated or measured in our organisation	2.94	1.062
M7 The employees' work wellbeing is evaluated or measured in our organisation	3.58	1.101
M8 The employees' expertise is evaluated or measured in our organisation	3.48	0.958
M9 The measurement information is used for developing the actions and operations of our organisation	3.37	1.047

of the issues related to innovation capability, it can be stated that the questions of this dimension reached much lower means (2.85–3.58) than the other dimensions. The means for the questions "leadership practices are evaluated or measured in our organisation", "our organisation has measures for evaluating development" and "the employees' ideas are evaluated or measured in our organisation" were less than three, which indicates that they were perceived as unfavourable.

As a summary of this section, it can be stated that the different dimensions of innovation capability appear to be on a satisfactory level. The most essential challenges for the future seem to be the linkage between rewarding and ideation, clarification of the innovation process, and the adaptability of employees concerning new ways of action. Regarding the expertise and work wellbeing, the most essential challenges seem to be the development of the practices for transferring tacit knowledge and the handling of the number of working tasks. The biggest challenge for the future appears to be the measurement and evaluation of the issues related to innovation capability, innovation processes, and innovations. It appears that the organisations do not have appropriate methods for the measurement and evaluation of these issues.

21.6 Findings

In this section, it is investigated whether differences can be found between organisations of different sizes, between industry- or service-oriented organisations, and between executives and employees. The differences have been studied by comparison of means, where the analysis of variance has been utilised.

First, the differences have been studied according to the amount of revenues. The revenue of the first group is 2–5 million euros, that of the second group is 5–20 million euros, and the revenue of the third group is 20–50 million euros. The

Table 21.4 Comparison of the means depending on revenue

Research question	Mean			F-value
	2–5 Meuro	5–20 Meuro	20–50 Meuro	
Exploitation of external knowledge				
U2 We have developed our ways of action by comparing our operations to other organisations	3.60	3.85	3.97	3.061*
Expertise (know-how)				
O2 We have instructions and responsible persons for work orientation	3.53	3.70	4.03	3.036*
O5 There are practices for transferring tacit knowledge	3.29	2.91	3.09	4.343*
Measurement				
M3 The functionality of internal processes is evaluated or measured in our organisation	3.28	3.49	3.91	4.826**

*$0.01 < p \leq 0.05$; **$0.001 < p \leq 0.01$; ***$p \leq 0.001$

significant differences concerning all the questions are illustrated in Table 21.4. As Table 21.4 indicates, a significant difference was found only in four questions. In the dimension of exploiting external knowledge, a significant difference was found only in the question "we have developed our ways of action by comparing our operations to other organisations". It seems that the larger companies are more familiar with or have more resources for benchmarking than the smaller ones. Regarding the dimension of expertise, significant differences were found in the questions of "we have instructions and responsible persons for work orientation" and "there are practices for transferring tacit knowledge". Tukey's post-hoc test reveals that a significant difference concerning the first question was between the smallest and the largest companies, and concerning the latter question between the smallest and middle-sized companies. This indicates that the guidance for work has been done more correctly in large companies than in the smaller ones. Furthermore, it seems that tacit knowledge is easier to transfer in small companies than in large ones. In small companies the employees are more familiar with each other, and they usually operate in the same environment, which may explain this result. As a whole, it can be stated that the revenue-based size of the company does not seem to have affected the perceptions of the respondents on innovation capability, expertise, work wellbeing, or measurement.

Next, the differences were studied between companies that have 10–49 employees and companies with 50–249 employees. Contrary of previous studies (e.g., Çakar and Ertürk 2010), the results suggest that the number of employees does not have a significant effect on innovation capability, employee expertise, work wellbeing, or measurement of issues related to innovation capability. As Table 21.5 illustrates, significant differences were found only in three questions. The companies employing over 50 people seem to have a possibility to offer more flexible work and working time in comparison to smaller companies. The larger companies are also more capable to evaluate leadership practices and work wellbeing than the small companies. However, the evaluation of leadership practices is on the whole at a rather poor level. Generally, it can be stated that the size of the company, including both the amount of revenues and the number of

Table 21.5 Comparison of the means depending on the number of employees

Research question	Mean		F-value
	10–49 empl.	50–249 empl.	
Work wellbeing			
T6 There is an opportunity for flexible working and working hours in our organisation	3.78	4.16	7.589**
Measurement			
M5 Leadership practices are evaluated or measured in our organisation	2.77	3.05	3.938*
M7 Employees' work wellbeing is evaluated or measured in our organisation	3.46	3.90	9.343**

*$0.01 < p \leq 0.05$; **$0.001 < p \leq 0.01$; ***$p \leq 0.001$

Table 21.6 Comparison of the means depending on the industry

Research question	Mean		F-value
	Industry	Service	
Individual creativity and innovation capability			
L3 The employees know how to be critical towards current ways of action when needed	3.87	4.08	5.633*
Expertise (know-how)			
O1 All employees have a possibility for education	3.48	3.96	15.261***
O6 In our organisation, learning is an investment, not an expense	3.65	3.94	7.293**
Measurement			
M8 The employees' expertise is evaluated or measured in our organisation	3.60	3.36	4.432*

*$0.01 < p \leq 0.05$; **$0.001 < p \leq 0.01$; ***$p \leq 0.001$

employees, do not have a remarkable effect on the perceptions of the respondents on innovation capability, expertise, work wellbeing, or measurement.

In Table 21.6, the significant differences between industry- and service-oriented companies are presented. In total, four significant differences were found. Concerning individual creativity, it seems that the employees have better abilities to be critical of inappropriate practices in service companies than in industrial companies. In contrast to industrial companies, the service companies seem to have better possibilities for education, and learning is seen to be an investment rather than an expense. However, the industrial companies are more capable of evaluating the expertise of their employees. Traditionally, the tasks and types of expertise are more specified in the industrial sector, and are thus easier to evaluate, for example, by a capability matrix. Generally, it can be stated that the orientation of the company on industry or service has not had a comprehensive effect on the perceptions of the respondents on innovation capability, expertise, work wellbeing, or measurement.

Next, the differences between executives and employees – including both white-collar and blue-collar workers – were studied. As Table 21.7 shows, significant differences were found in all the questions concerning the dimensions of innovation structures, culture, and leadership. A significant difference was also found in the dimension of exploitation of external knowledge in the question "we have developed our ways of action by comparing our operations to other organisations". In contrast, significant differences were not found in any of the questions concerning the dimension of individual creativity and innovation capability. In all the significant differences in Table 21.7, the perception of the executives was more positive than the perception of the employees. The results indicate that there is a lot of work to do around innovation capability in the companies. Especially the areas of innovation structures, culture, and leadership need to be enhanced to fill this gap and to keep the perception of the employees at least on a satisfactory level.

When focusing on the dimensions of expertise, work wellbeing and measurement presented in Table 21.8, significant differences can be found in all the

Table 21.7 Comparison of the means depending on the position of the respondent

Research question	Mean		F-value
	Exec.	Empl.	
Exploitation of external knowledge			
U2 We have developed our ways of action by comparing our operations to other organisations	3.84	3.48	7.989**
Innovation structures			
I1 Co-operation works well in our organisation	3.94	3.56	10.319***
I2 We have a clear way of processing and developing ideas	3.42	3.00	9.067**
I3 The employees get feedback for their ideas	3.96	3.43	24.170***
I4 Our reward system encourages ideation	2.95	2.58	6.919**
Culture			
K1 Our organisation actively finds new ways of action	3.86	3.30	16.832***
K2 Our organisation has the courage to try new ways of action	3.97	3.42	21.170***
K3 When experimenting with new ways of action, mistakes are allowed	4.00	3.45	24.033***
K4 The employees have the courage to disagree	4.09	3.61	20.561***
Leadership			
J1 The managers encourage initiatives	3.84	3.39	14.575***
J2 The managers give positive feedback	3.76	3.14	32.988***
J3 The managers pass the employees' ideas to the upper levels of the organisation	3.76	3.39	10.922***
J4 The managers participate in ideation and development	4.10	3.76	10.619***

*$0.01 < p \leq 0.05$; **$0.001 < p \leq 0.01$; ***$p \leq 0.001$

questions, aside from the questions "there is an opportunity for flexible working and working hours in our organisation", "our organisation has measures for evaluating development", and "exploitation of external (customers, competitors etc.) knowledge is evaluated or measured in our organisation". As work wellbeing and expertise are drivers for the different dimensions of innovation capability (e.g., Viitala 2005; Salojärvi 2006), these issues should be enhanced to keep the perception of the employees on a more satisfactory level. Significant differences between the executives and employees concerning the different aspects of innovation capability -related measurement were also found in most of the questions. The most worrying result of this issue is that the perception of the executives was only on a neutral or negative level, and the perception of the employees was mainly on a negative level. Hence, there is a major challenge for both academics and practitioners to develop new practices and methods for the measurement and evaluation of the issues related to innovation capability.

As a summary of this section, it can be stated that the perceptions regarding the different dimensions of innovation capability, employee expertise, work wellbeing, and measurement of issues related to innovation capability seem to be dependent on the organisational position of the respondent. On the other hand, the size of the organisation (both the amount of revenue and the number of employees) or the industry do not have an effect on the perceptions.

Table 21.8 Comparison of the means depending on the position of the respondent

Research question	Mean		F-value
	Exec.	Empl.	
Expertise (know-how)			
O1 All employees have a possibility for education	3.82	3.44	6.966**
O2 We have instructions and responsible persons for work orientation	3.80	3.21	17.762***
O3 The employees are encouraged to be multi-skilled	4.18	3.57	42.477***
O4 Voluntary learning and development of expertise are supported in our organisation	3.86	3.52	8.403**
O5 There are practices for transferring tacit knowledge	3.25	2.68	16.920***
O6 In our organisation, learning is an investment, not an expense	3.91	3.45	14.515***
Work wellbeing			
T1 The employees prosper in our organisation	4.08	3.77	11.728***
T2 The employees are treated equally	4.10	3.26	53.729***
T3 The employees are appreciated for their work	3.96	3.36	42.998***
T4 The number of working tasks is suitable	3.39	3.00	7.864**
T5 The quality, demands and responsibility of tasks are suitable	3.79	3.57	3.953*
Measurement			
M3 The functionality of internal processes is evaluated or measured in our organisation	3.54	3.14	7.625**
M5 Leadership practices are evaluated or measured in our organisation	2.96	2.51	9.356**
M6 The employees' ideas are evaluated or measured in our organisation	3.04	2.66	7.067**
M7 The employees' work wellbeing is evaluated or measured in our organisation	3.75	3.00	26.454***
M8 The employees' expertise is evaluated or measured in our organisation	3.55	3.25	5.235*
M9 The measurement information is used for developing the actions and operations of our organisation	3.55	2.80	29.467***

*$0.01 < p \leq 0.05$; **$0.001 < p \leq 0.01$; ***$p \leq 0.001$

21.7 Summary and Conclusion

The current literature highlights the role of organisations' innovation capability as crucial, as innovations play a key role in the survival and growth of organisations, as well as in acquiring sustainable competitive advantage. The expertise and work wellbeing of employees are emphasised as drivers for innovation capability. Also the measurement and evaluation of innovation capability are seen as essential when focusing on the development of innovation capability.

The study focused on the current state of innovation capability, expertise, work wellbeing, and measurement in Finnish SMEs. It was concluded that the size of the organisation and the industry did not have a significant effect on innovation capability, expertise, work wellbeing, and measurement. The most important insight of the study was that the organisational position of the respondent seemed to have a significant effect on the different dimensions of innovation capability, employee expertise, work wellbeing, and measurement of issues related to

innovation capability. The most significant differences between executives and employees concerning innovation capability were related to culture, leadership, and innovation structures. The entirety of measurement and the evaluation of issues related to innovation capability were on a poor level in comparison to the other issues studied. This can be explained by the intangible nature of innovation capability, which appears as difficulties in evaluation, and especially in measurement. As the sample covered 2,400 out of around 8,000 SMEs in Finland, and 311 valid responses were achieved, it can be stated that the results describe very well the current state in Finland of the issues studied.

For the future, both academics and practitioners should focus on the development of new methods and practices for enhancing innovation capability, and especially the measurement of issues related to it. From the viewpoint of the Doing, Using and Interacting (DUI) mode of innovation and practice-based innovation, it is essential to reduce the gap between the perceptions of executives and employees, and to get the perception of the employees to a more satisfactory level.

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THE ROLE OF INNOVATION CAPABILITY IN ACHIEVING HIGHER PERFORMANCE

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THE ROLE OF INNOVATION CAPABILITY IN ACHIEVING HIGHER PERFORMANCE

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1 Introduction

The organizational capability to innovate has been of great interest to scholars who study the increasing need for innovation. In this paper, innovation is seen as an iterative process that aims at creating of new products, processes, knowledge or services by the use of new or even existing knowledge (Kusiak, 2009). Innovation capability has been suggested to play a key role in the survival and growth of organizations (Francis and Bessant, 2005). Several studies have examined the relationship between innovation and firm performance (Calantone et al., 2002; Cainelli et al., 2004; Keskin, 2006; Bowen et al., 2010; Jiménez-Jiménez and Sanz-Valle, 2011) and presented innovation as an important determinant for the success of a firm. The effects of the aspects of innovation capability on firm performance are a less studied area of research. Individual aspects of innovation capability and their relationship to firm performance have been studied, but there is no consensus between scholars on whether the relationship is positive or negative or whether it even exists.

Innovation capability has been defined in several ways in the current literature. The categories used in the area of innovation capability often adopt a certain type of innovation, such as product innovation or process innovation, instead of the overall innovation capability (Ibrahim et al., 2009). Innovation capability has also been divided into radical and incremental innovation capability (Sen and Egelhoff, 2000). Also the effects of innovation

capability on firm performance have usually been studied by using the above mentioned categories. Innovation capability has been measured through numeric values, for example the number of innovations generated. A majority of these studies has concentrated on large companies and relationship between their innovation capability and performance. According to Rosenbusch et al. (2011) focusing only on delivering innovative offerings to the market place may not fully leverage the potential of innovation. Small and medium sized enterprises (SMEs) can benefit even more if they develop, communicate, and embrace an innovation orientation. Thus, the current measures of innovation capability do not capture the elements of innovation capability essential in the perspective of SMEs. Moreover, the empirical studies that discuss organizational innovation capability and its relationship to firm performance consider innovation capability as a one- or two-dimensional construct. Studies that cover innovation capability as a whole and its effects are rare. The question that has remained unsolved is whether the various aspects of innovation capability together have an impact on firm performance in the context of SMEs.

The objective of this research is to study the relationship between organizational innovation capability and firm performance. The study contributes to the current understanding by presenting the important aspects of organizational innovation capability that have a direct connection to firm performance, and goes one step further by studying the determinants of innovation capability and their relationship with firm performance. Further, previous research has often concentrated either on innovation capability as one dimension without studying the relationship aspect by aspect, or on studying only the effects of one aspect of innovation capability. Therefore, the results of the study contribute to the current literature by investigating the relationship of multiple aspects of innovation capability and firm performance. The paper is organized as follows. First, the literature on innovation capability

and its link to firm performance is reviewed. Next, the methods used in this research are described, followed by the results. Finally, the implications of the findings and the potential for future research are discussed.

2 Literature review

2.1 Innovation capability

Innovation capability has been suggested to be a multi-faceted construct. There is no common way of analysis by which to study it, due to the variety of perspectives of innovation management (Perdomo-Ortiz et al., 2006). According to Neely et al. (2001), an organization's innovation capability can be described as its potential to generate innovative outputs. Similarly, Lawson and Samson (2001), consider innovation capability as a theoretical framework aiming to describe the actions that can be taken to improve the success of innovation activities. Prajogo and Ahmed (2006) discuss technological and human factors of innovation management. The human factors include people and social practices as ingredients in organizational success. Martínez-Román et al. (2011) divide innovation capability into three factors: the knowledge, organization and human factors. Perdomo-Ortiz et al. (2006) use the term business innovation capability to describe the critical success factors of innovation processes. These critical factors can be interpreted as business innovation capability dimensions, and the capability can be measured with the factors.

Thus, one viewpoint is to specify the organizational aspects of innovation. A body of literature has identified the common factors shared by innovative organizations and the factors that impact on the ability to manage innovation (Smith et al., 2008). In this study,

innovation capability is defined similarly to consist of the aspects influencing an organization's capability to manage innovation. According to earlier literature, these aspects include for example leadership practices (Bessant, 2003; Tidd et al., 2005; Perdomo-Ortiz et al. 2006; Martensen et al., 2007; Colarelli O'Connor, 2008; Skarzynski and Gibson, 2008; Smith et al., 2008; Kallio et al., 2012), employees' skills and innovativeness (Perdomo-Ortiz et al. 2006; Martensen et al., 2007; Colarelli O'Connor, 2008; Skarzynski and Gibson, 2008; Tura et al., 2008; Smith et al., 2008; Kallio et al., 2012), processes and tools for idea management (Lawson and Samson, 2001; Tidd et al., 2005; Skarzynski and Gibson, 2008; Smith et al., 2008), supporting culture (Lawson and Samson, 2001; Tidd et al., 2005; Martensen et al., 2007; Colarelli O'Connor, 2008; Skarzynski and Gibson, 2008; Smith et al., 2008; Kallio et al., 2012), external sources for information (Romijn and Albaladejo, 2002; Tidd et al., 2005; Perdomo-Ortiz et al. 2006; Colarelli O'Connor, 2008; Kallio et al., 2012; Laforet, 2011), development of individual knowledge (Bessant, 2003; Tidd et al., 2005; Martínez-Román et al., 2011), employees' welfare (Laforet, 2011), and linkage to strategic goals (Bessant, 2003; Martensen et al., 2007; Smith et al., 2008).

In this paper, innovation capability is divided into seven dimensions, following Saunila and Ukko's (2013) study. The dimensions are participatory leadership culture, ideation and organising structures, work climate and well-being, know-how development, regeneration, external knowledge, and individual activity. This definition was chosen because it broadly covers the important dimensions of innovation capability. These dimensions are proposed to exist, to some degree, within firms with high innovation capability.

- The *participatory leadership culture* dimension is related to an organisational culture that supports innovation. The dimension reflects the overall atmosphere of the

organisation that supports and motivates innovation and a leadership culture that facilitates innovation.

- The *ideation and organising structures* dimension includes the structures and systems that successful innovation requires. This includes the generation, development, and implementation of ideas, and the ways in which the organisation's work tasks are organised.
- The *work climate and well-being* dimension includes employee well-being, and the work climate for innovation development, including collaboration and values.
- The *know-how development* dimension points out that employee expertise plays an important role in the development of the organisation's innovation capability. This includes knowledge as well as improvement in employee skills.
- The *regeneration* dimension reflects the organisation's ability to learn from experience and to use that experience to create and develop innovations.
- The *external knowledge* dimension emphasises the importance of exploiting external networks and knowledge for the overall organisational innovation capability. Thus, the dimension reflects the organisation's internal capability to exploit external information in developing innovation capability.
- The *individual activity* dimension expresses that employees' individual innovation capability and activity are needed to form the organisation's overall innovation capability. This dimension includes the characteristics associated with higher innovation capability and employee motivation to foster innovations. (Saunila and Ukko, 2013)

In next two sections, we will go a step deeper into each determinant of innovation capability and show how each determinant contributes to innovation capability and further performance.

2.2 Innovation capability and firm performance

According to Calantone et al. (2002), innovativeness is the most important determinant of an organization's performance. Tidd (2001) divides measures that are used to prove the relationship between innovation and business performance into two categories. The first group concerns accounting and financial performance. These measures include profitability, return on investment and share price. The second group concerns market performance, for example the share or growth. Several studies have examined the relationship between innovation and firm performance (Calantone et al., 2002; Cainelli et al., 2004; Keskin, 2006; Bowen et al., 2010; Jiménez-Jiménez and Sanz-Valle, 2011) and support the idea that innovation is a key driver of firm success. The study of Calantone et al. (2002) reveals that a firm's innovativeness, measured by the rate of adoption of innovations by the firm and as the organization's willingness to change, is positively related to firm performance. Cainelli et al. (2004) found that innovation can explain a firm's economic performance. Innovating firms have higher levels of productivity and economic growth than non-innovating firms. The results of the study of Keskin (2006) demonstrate that a firm's innovativeness, meaning a willingness to try out new ideas, seek out new ways to do things, be creative in the methods of operation, and the rate of product introduction, have a positive impact on firm performance in SMEs. Bowen et al. (2010) have examined the relationships between organizational innovation and performance. Their findings suggest that innovation and organizational performance are overall positively correlated. Jiménez-Jiménez and Sanz-Valle (2011) also found a positive and significant effect of organizational innovation on performance, covering the number of innovations, the proactive or reactive character of those innovations, and the resources the firm invests on innovation.

Also the effects of different types of innovation have been studied in earlier literature. Subramanian and Nilakanta (1996) found that different kinds of innovation have an impact on different fields of performance. Organizational innovations improve coordination and co-operation in the organization, and they have been indicated also as better results in efficiency measures. Technical innovations improve the organization's competitiveness, and they have been shown to have a positive impact on the results of effectiveness measures (Subramanian and Nilakanta, 1996). According to Gopalakrishnan (2000), the speed and magnitude of innovation are linked to the results of different measures of performance. Innovation speed has a strong impact on financial performance, measured by the average return on assets. However, innovation speed is not associated with executives' perceptions of overall performance. Innovation magnitude is associated with executives' positive perceptions of overall performance, even though it does not have a significant impact on financial performance (Gopalakrishnan, 2000). On the other hand, Varadarajan (2009) points out that not only radical innovations but also incremental innovations are critical for the survival, growth, and profitability of organizations. On the basis of earlier literature, Armbruster et al. (2008) show that organizational innovations act as prerequisites and facilitators of an efficient use of technical product and process innovations, and therefore they are sources of competitive advantage. Organizational innovations themselves have an impact on business performance with regard to productivity, lead times, quality and flexibility (Armbruster et al., 2008).

2.3 Hypothesis development

Participatory leadership culture and firm performance

A participative and consultative management style is crucial for innovation (Wan et al., 2005; Yukl, 1998). The ability to lead, direct and support the creation and sustaining of innovation behaviors is important for a firm (Bessant, 2003). Therefore, it is important that managers invest time in increasing the personnel's opportunities to participate in development activities (Lampikoski and Emden, 1999), as well as strike a balance that allows the employees to act on good ideas (Dobni, 2008). Today, leadership is seen as a skill to direct the employees' energy towards the right direction instead of giving orders and instructions (Lampikoski and Emden, 1999). The management style is connected to the culture of the firm, which also plays an important role in motivating the employees. Innovation capability requires a collaborative, open culture and incentives that reward challenging current actions (Skarzynski and Gibson, 2008). The results of the study of Døjbak Haakonsson et al. (2008) confirm a complex relationship between organizational climate and leadership style and their interactive effects on performance.

Leadership practices can be viewed as enablers of innovations and further, higher performance. According to Zhu et al. (2005), leadership is actually one of the key driving forces for improving firm performance. This research stream suggests that transformational leadership will result in high levels of cohesion, commitment, trust, motivation, and performance in these new organizational environments. Carmelia et al. (2010) have studied the relationship between innovation leadership and performance. Innovation leadership covers the encouragement of individual initiatives, clarification of individual responsibilities, provision of clear and complete performance evaluation feedback, strong task orientation, emphasis on quality group relationships, and trust in organizational members. This innovation leadership was found to be associated with all the three studied aspects of

organizational performance – economic performance, relationship (process) performance, and product performance. On the basis of earlier studies, a hypothesis can be formed as follows:

Hypothesis 1: The higher the firm's participatory leadership culture, the greater the firm's overall performance

Ideation and organizing structures and firm performance

Bessant (2003) highlights the importance of the ability to create consistency between innovation values and behavior and the organizational context (structures, procedures etc.), as well as the ability to move innovative activity across organizational boundaries. Therefore, innovation requires supporting tools to enable an idea generation pipeline (Skarzynski and Gibson, 2008). According to Subramanian and Nilakanta (1996), decentralized and informal organizational structures facilitate innovations. They also propose that flexibility and openness of structures help to encourage new idea generation. Lawson and Samson (2001) have also identified that proper organizational structures and systems are likely to have an effect on innovation capability. A supportive structure plays an important role in improving communication in the organization (Dixit and Nanda 2011). Reward systems are powerful motivators and foster creative behavior (Lawson and Samson, 2001).

Some evidence also suggests that organizational structures can affect firm performance positively. For example Varadarajan (2009) suggests that firms should strive to nurture organizational conditions, including organizational climate, processes, policies, structure, and systems, conducive to superior performance in the realm of incremental innovations. A study of Jiménez-Jiménez and Sanz-Valle (2011) shows that age allows a company to develop

organizational routines that help them to conduct their activities more efficiently, and therefore obtain better performance. Thus, the following hypothesis can be formulated:

Hypothesis 2: The higher the firm's ideation and organizing structures, the greater the firm's overall performance

Work climate and wellbeing and firm performance

Innovation is more likely in a situation where people attribute high levels of integrity, competence, reliability, loyalty and openness to others and view others as equals. Creating this environment involves having employees understand their roles, and then further developing their creative and independent sides (Dobni, 2008). An employee's motivation is also connected to his/her wellbeing and experience as a member of the work community (Viitala, 2005). According to McMurray et al. (2010), leaders who demonstrate empowering behaviors through transformational leadership enhance the employees' wellbeing. According to Dobni (2008), favorable conditions require that the employees are treated equally.

Consistent with previous approaches, this study considers that the climate and wellbeing of the employees may influence the firm performance. Ozcelik et al. (2008) show that leadership practices that facilitate a positive emotional climate in an organization have a significant effect on the firm's performance. In addition, they suggest that the emotional climate practices of a leader are significantly related to the firm's growth, in terms of both strategic growth and outcome growth. A positive relationship between some dimensions of social capital and performance was also found in a study by Andrews (2011). The analysis indicated that relational (trust between actors) and cognitive (shared goals and values among

actors) social capital were positively related to organizational performance. The hypothesis is as follows:

Hypothesis 3: The higher the firm's work climate and wellbeing, the greater the firm's overall performance

Know-how development and firm performance

According to Tura et al. (2008), also expertise and knowledge are needed to build innovation. It has been suggested that a continuous learning orientation is central for innovation (Calantone et al., 2002; Keskin, 2006). An organization committed to learning seeks a full understanding of its environment, including the customers, competitors, and emerging technology (Calantone et al. 2002). Also Tidd et al. (2005) state that an innovative organization involves key individuals, as well as continuing and stretching individual development.

The argument that the employees' know-how development has an effect on firm performance, has also been presented in the literature. Schroeder et al. (2002) have developed resource-based hypotheses and show a positive relationship between internal and external learning and manufacturing performance. Also Aragón-Correa et al. (2007) verify a positive and significant association between organizational learning and performance. The results of López-Nicolás and Meroño-Cerdán (2011) show that strategic knowledge management, which is related to the processes and infrastructures firms employ to acquire, create and share knowledge for formulating strategy and making strategic decisions, has an impact on organizational performance. Based on the above, the hypothesis is as follows:

Hypothesis 4: The higher the firm's know-how development, the greater the firm's overall performance

Regeneration and firm performance

Organizations need to be tolerant of the mistakes that will occur and allow for recovery and learning from failures (Wan et al., 2005; Lawson and Samson, 2001) to achieve higher innovation capability. It has also been suggested that important issues for innovation are the belief that innovation is important, willingness to take risks, and willingness to exchange ideas (Wan et al. 2005). In addition, mutual trust and respect create an atmosphere that encourages individuals to try new ideas without fear of failure and its consequences (Lampikoski and Emden, 1999; Wan et al., 2005).

As a wide spread of innovation literature suggests, a firm's ability to regenerate affects its innovativeness and also its performance. Tellis et al. (2009) show that the corporate culture (e.g. willingness to cannibalize, future orientation, tolerance for risk, etc.) is the most important driver for radical product innovation, and that such innovations have a positive effect on the firm's financial performance. When firms frequently try out new ideas, seek new ways to do things, develop new product/services, and try to be creative in their methods of operation, they become more profitable, and get a higher market share and growth rate (Keskin 2006). Also Hung and Chiang (2010) suggest that high entrepreneurial orientation, meaning engaging in technological innovations, undertaking risky ventures, and pursuing opportunities proactively, affects firm performance. The hypothesis is:

Hypothesis 5: The higher the firm's regeneration, the greater the firm's overall performance

External knowledge and firm performance

Collaborative networks are opportunities for SMEs to learn and prosper (Forsman, 2009). According to Swink (2006), the firm's ability to collaborate externally is a key to its innovative success. The strength of inter-firm relationships influences the extent of tacit knowledge transfer, and the tacit knowledge obtained from partner firms affects a firm's innovation capability (Cavusgil et al., 2003). Interaction with suppliers, customers, industry associations, competitors and the like can provide missing external inputs that the organization itself cannot provide (Lawson and Samson, 2001; Romijn and Albaladejo, 2002). Jenssen and Nybakk (2009) suggest that external relationships are important for innovation also in small companies, at least in knowledge-intensive businesses.

Acquiring and exploiting external knowledge is also essential for innovation and for firm performance. If firms do not translate the knowledge generated internally or acquired from the firm's external environment into new products or processes, superior performance will not be obtained (Fores and Camison, 2011). According to Chapman (2006), innovations have a strong effect on financial success. Chapman found a strong link between collaboration and financial performance - organizations using external sources achieved higher revenue growth than others. The study of Hung and Chiang (2010) reveals that concentrating on open innovation by improving innovation performance, not by developing all technologies themselves but by interacting with outside parties, can result in a higher performance. Chen and Chiang (2011) suggest that building network agility, i.e. customer agility, partnering

agility, and operational agility, is a source for boosting operational performance, which then enhances financial performance. Therefore, on the basis of earlier literature, the following hypothesis can be formulated:

Hypothesis 6: The higher the firm's exploitation of external knowledge, the greater the firm's overall performance

Individual activity and firm performance

Innovations can emerge from shop-floor workers and professionals to middle managers across the boundaries of existing departments and professions (Kesting and Ulhøi, 2010). According to Hotho and Champion (2011) the source of innovation resides in the creativity and innovator capability of people. People who have creativity and intrinsic motivation (as well as skills) for their work will be favorable for creating a work environment that supports the creation of innovations. Also a study of Dixit and Nanda (2011) shows that the motivation of the employees is an important factor in a creative organization. Creative thinking includes the following: the individual has new perspectives on problems, is willing to take risks, and has tolerance for ambiguity (Amabile, 1997). According to Kleysen and Street (2001), individual innovative behavior requires a good correlation between five dimensions: opportunity exploration, generativity, formative investigation, championing and application, and individual innovation behavior. According to Calantone et al. (2002), for effective innovation, established norms, practices, and beliefs may have to be challenged. So, as business realities change, the employees' behavior and actions need to be adjusted accordingly (Dobni, 2008).

Finally, firms gain competitive advantage from their employee's motivation and activity as well. According to Steenkamp and Kashyap (2010), employee innovativeness is important to the future success of a firm and gives the firm a competitive advantage. Employees' commitment, positive attitudes and behavior, and motivation are suggested to create value to a firm (Beattie and Smith, 2010). Therefore, the individual activity of the employees should have an effect also on firm performance. The hypothesis is as follows:

Hypothesis 7: The higher the individual activity of the employees, the greater the firm's overall performance

2.4 The research framework

The relationship between overall innovation and innovation capability and performance has been the topic of several earlier studies. However, the effects of the aspects of innovation capability on the performance of a firm are still not clear. Some individual aspects and their relationship to performance have been studied, but there is a lack of studies concentrating on the aspects of innovation capability as a whole for achieving higher performance. The purpose of this study is to explore the impact of the aspects of innovation capability on firm performance within the context of SMEs. The theoretical review discussed above led to the research framework presented in Figure 1.

As presented above, the aim of this study is to examine the relationship between innovation capability and firm performance. Innovation capability has been defined through aspects influencing an organization's capability to manage innovation. These aspects include participatory leadership culture, ideation and organizing structures, work climate and

wellbeing, know-how development, regeneration, external knowledge, and individual activity. The basis of the framework is the idea that a firm has to concentrate on developing the seven aspects of innovation capability in order to achieve higher overall performance. In order to reach the research aim, seven hypotheses were developed, as presented above.

3 Methods

3.1 Data

The data used to test the hypotheses was gathered from Finnish SMEs with a web-based questionnaire. SMEs with less than 10 employees were excluded from the sample. The sample covered 2400 SMEs employing 11-249 persons and having a revenue of 2-50 Meuro. The sample was randomly selected. A representative of both management and employees received an invitation to participate in the study. Thus, 4800 questionnaires were sent. A total of 4050 questionnaires reached the informants, while 750 questionnaires were returned to the researchers with return-to-sender (RTS) messages, indicating that the addresses were no longer valid. The delivery of the questionnaire was conducted in four waves. One week after the first mailing of the questionnaire, reminder questionnaires were sent out. The rest two reminders were sent a week after the previous reminder. This process resulted in a total of 311 responses, and discounting the number of RTS mails, the final response rate was 7.68 per cent.

To check the non-response bias, an analysis of variance (ANOVA) test was performed. The informants were divided into four groups: the first informants, the first follow-ups, the second follow-ups and the third follow-ups. The results of the ANOVA test revealed that there was

no significant difference (at the 5 per cent significance level) between the four groups. Therefore, it could be assumed that the responses reflected the whole sample well.

The background information of the informants is presented in Table 1. In terms of firm size based on the number of employees, 72 per cent of the responses came from firms with 49 employees or less, and around 28 per cent were from firms with 50-249 employees. Based on revenue, around 45 per cent of the responses were from firms with 2-5 Meuro revenue, around 43 per cent from firms with 5-20 Meuro revenue, and around 11 per cent from firms with 20-50 Meuro revenue. As can be seen in the table, the responses are nearly equal in the industrial and service sectors. A majority of the responses were received from executives, as about 30 per cent of the responses came from employees.

3.2 Development of the questionnaire

The approach of this study is quantitative. The questionnaire developed for the study consisted of two major parts. The first part comprised 30 items measuring different issues related to innovation capability, divided into seven subcategories. The second part comprised 2 items measuring performance. The items for the questionnaire were operationalized on the basis of a literature review. Some efforts were made to maximize the validity and reliability of the construct. When available and appropriate, existing measurements that had been empirically tested were utilized. New items were built on the basis of previous studies. The items were reviewed and revised with a group of researchers. The researchers were asked to critically analyze each of the items with respect to the concept it was intended to measure, as well as the appropriateness of each item.

3.3 Measures

The independent variables of the study were participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity. Each of these variables was measured by a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A neutral response "neither disagree nor agree", was adopted to reduce uninformed responses. When possible, validated measures reported in previous research were used. When the items had to be modified, they were derived from the literature.

Participatory leadership culture was measured with six items. Items modified from studies by Tang (1999), Otala (2003), Wang and Ahmed (2004), Martensen et al. (2007), Dobni (2008), and Kallio et al. (2012) were used. The items dealing with participatory leadership culture were the following: "The managers encourage initiatives", "The managers give positive feedback", "The managers pass employees' ideas to the upper levels of the organization", "The managers participate in ideation and development", "There are practices for transferring tacit knowledge", and "The employees are appreciated for their work".

Ideation and organizing structures was measured with six items. The items were developed from the research of Tang (1999), Otala (2003), and Martensen et al. (2007). The measurement scales for ideation and organizing structures included the following: "We have a clear way of processing and developing ideas", "The employees get feedback for their ideas", "Our reward system encourages ideating", "We have instructions and responsible persons for work orientation", "The number of working tasks is suitable", and "The quality, demands and responsibility of tasks are suitable".

Work climate and wellbeing was measured by a five-item scale modified from Samson and Terziovski (1999), Tang (1999), Otala (2003), Wang and Ahmed (2004), Dobni (2008), and Kallio et al. (2012). Sample items were "Co-operation works well in our organization", "The employees have the courage to disagree", "The employees are encouraged to be multi-skilled", "The employees prosper in our organization", and "The employees are treated equally".

A three-item scale was used to measure know-how development, drawn from Samson and Terziovski (1999), Calantone et al. (2002), and Otala (2003). Sample items included "All employees have a possibility for education", "Voluntary learning and development of expertise are supported in our organization", and "In our organization, learning is an investment, not an expense".

Regeneration was measured by three items adapted from Hurt et al. (1977), Wang and Ahmed (2004), Martensen et al. (2007), and Dobni (2008). The items were "Our organization seeks new ways of action actively", "Our organization has the courage to try new ways of action", and "When experimenting with new ways of action, mistakes are allowed".

Using the scales established by Guan and Ma (2003), Martensen et al. (2007) Dobni (2008), and Kallio et al. (2012), a scale of three items was drawn up to measure the activity of exploiting external knowledge. The items were the following: "My work community encourages gaining knowledge through external contacts", "We have developed our ways of action by comparing our operations to other organizations", and "We develop our actions together with our stakeholders (customers etc.)".

The individual activity of the employees was measured by three items that were based on the work of Hurt (1977), Tang (1999), Dobni (2008), and Kallio et al. (2012). The measurement scales for individual activity included the following: "The employees are willing to participate in development", "It is easy for the employees to adopt new ways of action", and "The employees know how to be critical towards current ways of action when needed".

The dependent variable, firm performance, was measured by two items. According to Bueno et al. (2010), the literature has established that there is a high correlation between objective and subjective data on performance, and therefore both are valid when calculating a firm's performance. In this study, subjective perceptions of the informants were used to measure the performance of the companies. The informants were asked to evaluate both the financial and operational (productivity, quality etc.) performance of the company within the past three years on a scale of 1 (weak) to 4 (excellent).

4 Results

The items, factor loadings, and reliability statistics are presented below. To assess the construct validity of the measurement scales, Factor Analysis (FA) was performed. The seven scales were subjected to principal component analysis to test the unidimensionality of the constructs and to eliminate unreliable items. One item was excluded, because it loaded alone among other items into one factor. As shown in Table 2, the results of the FA suggest that the standardized loadings are highly significant for all the remaining items (the loadings vary from 0.484 to 0.869), suggesting that the underlying constructs are valid.

To test the reliability of the results, a Cronbach's alpha test was performed. The alpha values of six factors, as shown in Table 2, are greater than 0.60. In one factor (individual activity) the alpha value is less than 0.50, which indicates that the reliability of the factor can be questioned, and therefore the results concerning the factor should be handled circumspectly. The overall alpha value of the 29 items is 0.903. The overall reliability of the construct is therefore supported.

Table 3 presents the means, standard deviations (SD) and intercorrelations of the variables used in this study. It was found that firm performance had a significant and positive correlation with two aspects of innovation capability, ideation and organizing structures and know-how development. In order to assess the extent of multicollinearity, the variance inflation factor (VIF) was computed. The VIFs ranged from 1.015 to 1.382, which are significantly below the cut-off value of 10, and therefore it is suggested that multicollinearity does not cause problems.

The hypotheses were tested by using the linear regression method. To assess whether the relationship between the aspects of innovation capability and performance was of different relevance for the overall responses, management responses and employee responses, the regression analyses were rerun for three split samples. In addition, the analyses were conducted together in all innovation capability aspects. Three control variables that might affect the relationship between a firm's innovation capability and performance were included: the industry and firm size (measured by both revenue and the number of employees). A dummy variable was used for the industry, divided into manufacturing and service industries. The results reported in Table 4 support some of the hypotheses. Only some aspects of innovation capability are significantly and positively related to firm performance.

The regression model (see Table 4), studying the relationship between innovation capability and overall performance, is significant (F = 8.759, Sig. 0.000). The R^2 is 0.087, meaning that 8.7 per cent of the variance in the dependent variable (overall performance) can be explained by the three aspects of innovation capability (ideation and organizing structures, participatory leadership culture, and know-how development). The standardized beta of ideation and organizing structures is 0.270 (Sig. 0.000), participatory leadership culture -0.212 (Sig. 0.004), and know-how development 0.155 (Sig. 0.024), indicating that ideation and organizing structures and know-how development are positively related to the overall performance, and the participatory leadership culture is negatively related to the overall performance. No significant differences were found in the control variables as regards the overall performance.

When checking the relationship between innovation capability and overall performance from the perspective of management, the following was found: the regression model (Table 4) is significant (F = 10.147, Sig. 0.000), with 17 per cent of the variance explained. However, from the perspective of management, the only aspects that affect the overall performance are ideation and organizing structures and participatory leadership culture. The standardized beta of ideation and organizing structures is 0.329 (Sig. 0.000) and participatory leadership culture -0.164 (Sig. 0.025). Therefore, the results reveal a positive relationship between ideation and organizing structures and overall performance, and a negative relationship between a participatory leadership culture and overall performance. An analysis of the impact of the control variables in the relationships between innovation capability and overall performance was also done. When checking the impact of the control variables (size of the company by revenue and number of employees and industry), a positive association between revenue and

overall performance, and a negative association between the number of employees and overall performance was found.

The next model, presented also in Table 4, investigates the effects of innovation capability to overall performance from the perspective of employees. This model is significant (Sig. 0.000) with F statistics (= 11.012). The R^2 indicates that 14.1 per cent of the variation in the overall performance is explained by the know-how development. The standardized beta of know-how development is 0.376 and significant (Sig. 0.000). The results indicate that according to the employees the only aspect of innovation capability that has a positive effect on overall performance is know-how development, which is consistent with the hypothesis. No significant differences were found in the control variables as regards the model.

Hypotheses 1, 2 and 4 are supported by the results of the study. The results of the regression models examining the impacts of innovation capability and a firm's overall performance suggest that the performance of an organization can be affected by some aspects of innovation capability. The findings also illustrate that the management and employees have different views on the aspects of innovation capability that affect firm performance.

5 Discussion

The paper has presented the results of a study investigating the relationship between organizational innovation capability and firm performance. The findings showed that three aspects of innovation capability, namely ideation and organizing structures, participatory leadership culture, and know-how development, have an effect on firm performance.

According to the results of the study, ideation and organizing structures are positively related to firm performance. This is in line with the study of Jiménez-Jiménez and Sanz-Valle (2011) which shows that organizational routines help firms to conduct their activities more efficiently and therefore obtain better performance. However, the impact of ideation and organizing structures was notable only from the perspective of the management. The employees did not consider them influential. Another aspect that has an effect on firm performance is a participatory leadership culture. Also a previous study of Zhu et al. (2005) concludes that leadership is one of the key driving forces for improving firm performance. However, in this study the effect was found to be negative between a participatory leadership culture and the overall performance. Thus, it can be suggested that for improving performance, the leadership should be less participatory than traditional, at least as regards innovation development. Know-how development was also found to be positively associated with overall performance. This positive relationship was found to be significant only from the perspective of the employees. From the perspective of the management, the relationship was not found to be influential. Also the previous studies of Schroeder et al. (2002) and Aragón-Correa et al. (2007) show a positive relationship between organizational learning and performance. This may be a consequence of the fact that it is usually suggested that a firm should develop its operations to adjust to the rapidly changing environment to achieve high performance.

The regression model investigating the issue from the perspective of management showed that also firm size, both revenue and the number of employees, can have an effect on the connection between aspects of innovation capability and firm performance. Previous studies have found firm size to be influential when developing innovations (e.g. Wolff and Pett, 2006; Plehn-Dujowich, 2009), and based on the results of the current study, this may be true

also as regards the innovation capability of SMEs. Thus, more research is needed to clarify the differences of the innovation capability of SMEs of different size.

Some aspects of innovation capability have a direct relationship to a firm's overall performance. To achieve higher performance, firms should develop these aspects. However, there are also four aspects of innovation capability that were not found to be influential when achieving higher performance. The results do not mean that these four aspects do not have value when enhancing performance. The value of these other four aspects on performance might be realized through other aspects or in other firm-specific contexts. This is because there are so many other things that affect firm performance in addition to innovation capability. Although there are a variety of studies confirming the positive effect on innovativeness on firm performance (e.g. Cainelli et al., 2004; Jiménez-Jiménez and Sanz-Valle, 2011), the aspects that drive firm innovativeness do not necessarily lead to higher performance directly. This may be a consequence of the fact that there are also many other things than innovation capability that affect a firm's overall performance. For example, the study of Armbruster et al. (2008) shows that organizational innovations act as prerequisites and facilitators of an efficient use of technical product and process innovations, and therefore they are sources of competitive advantage. Organizational innovations themselves have an impact on productivity, lead times, quality and flexibility (Armbruster et al., 2008). Thus, the effects of innovation capability should be measured also by some intermediate measures. There are many things between a firm's capability to produce innovations and firm performance that affect the development of innovation capability as an asset of the firm. The true effects on innovation capability to firm performance may be difficult to track directly.

6 Conclusions

This study has examined the impacts of innovation capability on firm performance. Previous research has concentrated on studying the effects of different types of innovation and firm performance. This study went a step further by studying the effects of a firm's capability to produce innovations on its performance. In addition, despite the literature suggesting a positive relationship between organizational innovation capability and performance, so far little research has analyzed the relationship by taking into account the various aspects of innovation capability in a single model. Three hypotheses were supported by the data of this study. According to the results, ideation and organizing structures seemed to be most influential when looking at the big picture of overall performance. It can also be concluded that the leadership culture should be less participatory than traditional to enhance performance. The results of the study did not support the direct relationship between exploitation of external knowledge, work climate and wellbeing, regeneration, and individual activity and firm performance, therefore suggesting that there are other factors that affect the exploitation of these aspects of innovation capability that mediate the relationship. As a limitation, the empirical findings cover a specific country only and may not be fully generalized.

This study contains some interesting findings that would provide good starting point for further studies. First, the relationship between a participatory leadership culture and firm performance was found to be negative. This result is somewhat contrary to previous research. Thus, the issue needs more research. Second, it is not clear whether and to what extent each of the innovation capability determinants correlate with each of the overall performance constructs. This should also be a subject of future studies. Third, the study did not clarify how

a linkage between the aspects of innovation capability and firm performance can be made. Further studies are needed to formulate measures for both aspects of innovation capability and firm performance so that the causal relationships can be identified. Fourth, there were also four aspects of innovation capability that were not found to have a direct relationship with firm performance. Thus, there may be other aspects that moderate the relationship. Further studies should identify these aspects, so that the path from the aspects of innovation capability and firm performance could be defined more exactly.

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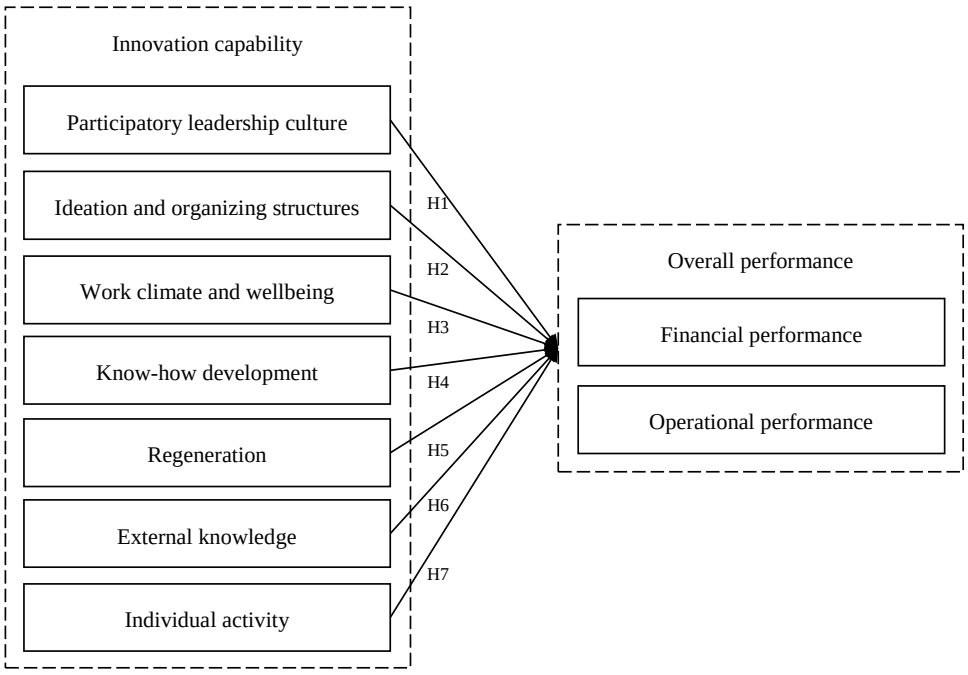

Figure 1. Research framework and hypotheses

Table 1. Background information of the informants

		n	%
Revenue (Meuro)	2-5	141	45.3
	5-20	135	43.4
	20-50	35	11.3
No of employees	10-49	224	72.0
	50-249	87	28.0
Industry	Industrial	145	46.6
	Service	159	51.1
	No response	7	2.3
Organizational position	Executive	222	71.4
	White-collar worker	68	21.9
	Blue-collar worker	12	3.9
	No response	9	2.9

Table 2. Means and standard deviations of the items, and parameter estimates for measurement relations

Item	Mean	Std. Dev.	Loadings	Cronbach´s alpha
Participatory leadership culture	**3.65**	**0.613**		**0.803**
12 The managers encourage initiatives	3.72	0.912	0.769	
13 The managers give positive feedback	3.60	0.844	0.749	
14 The managers pass employees' ideas to the upper levels of the organization	3.67	0.864	0.747	
15 The managers participate in ideation and development	4.02	0.781	0.776	
23 There are practices for transferring tacit knowledge	3.12	1.055	0.573	
27 The employees are appreciated for their work	3.80	0.706	0.686	
Ideation and organizing structures	**3.45**	**0.628**		**0.708**
5 We have a clear way of processing and developing ideas	3.32	1.032	0.772	
6 The employees get feedback for their ideas	3.82	0.828	0.714	
7 Our reward system encourages ideating	2.86	1.062	0.689	
20 We have instructions and responsible persons for work orientation	3.66	1.061	0.553	
28 The number of working tasks is suitable	3.29	1.015	0.484	
29 The quality, demands and responsibility of tasks are suitable	3.73	0.807	0.624	
Work climate and wellbeing	**3.94**	**0.597**		**0.786**
4 Co-operation works well in our organization	3.84	0.852	0.704	
11 The employees have the courage to disagree	3.97	0.820	0.742	
21 The employees are encouraged to be multi-skilled	4.03	0.740	0.713	
25 The employees prosper in our organization	4.00	0.687	0.707	
26 The employees are treated equally	3.87	0.915	0.807	
Know-how development	**3.76**	**0.783**		**0.738**
19 All employees have a possibility for education	3.72	1.072	0.778	
22 Voluntary learning and development of expertise are supported in our organization	3.78	0.881	0.819	
24 In our organization, learning is an investment, not an expense	3.80	0.924	0.843	
Regeneration	**3.80**	**0.784**		**0.766**
8 Our organization seeks new ways of action actively	3.72	1.040	0.813	
9 Our organization has the courage to try new ways of action	3.83	0.941	0.869	
10 When experimenting with new ways of action, mistakes are allowed	3.86	0.860	0.799	
External knowledge	**3.96**	**0.733**		**0.625**
1 My work community encourages gaining knowledge through external contacts	4.00	1.042	0.742	
2 We have developed our ways of action by comparing our operations to other organizations	3.75	0.985	0.797	
3 We develop our actions together with our stakeholders (customers etc.)	4.13	0.864	0.731	
Individual activity	**3.59**	**0.612**		**0.486**
16 The employees are willing to participate in development	3.70	0.830	0.758	
17 It is easy for the employees to adopt new ways of action	3.12	0.959	0.764	
18 The employees know how to be critical towards current ways of action when needed	3.97	0.734	0.570	

Table 3. Means, standard deviations and intercorrelations of the variables

	Mean	SD	1	2	3	4	5	6	7
1 External knowledge	3.96	0.733	1.000						
2 Work climate and wellbeing	3.94	0.597	0.294***	1.000					
3 Ideation and organizing structures	3.45	0.628	0.256***	0.565***	1.000				
4 Regeneration	3.80	0.784	0.376***	0.443***	0.427***	1.000			
5 Participatory leadership culture	3.65	0.613	0.269***	0.632***	0.562***	0.532***	1.000		
6 Individual activity	3.59	0.612	0.161***	0.384***	0.285***	0.377***	0.408***	1.000	
7 Know-how development	3.76	0.783	0.225***	0.481***	0.484***	0.393***	0.466***	0.293***	1.000
8 Performance	2.68	0.713	0.006	0.109	0.225***	0.056	0.012	0.088	0.187**

Sign. *** ≤ 0.001, ** 0.001 < p ≤ 0.01, * 0.01 < p ≤ 0.05

Table 4. Regression results of perceived overall performance

Dependent variable	Perceived overall performance					
	Overall		Management		Employees	
	Beta	t	Beta	t	Beta	t
Independent variables						
External knowledge	-0.045	-0.738	0.009	0.140	-0.127	-0.986
Work climate and wellbeing	0.032	0.398	0.089	1,189	0.053	0.400
Ideation and organizing structures	0.270	3.688***	0.329	4.661***	0.161	1.150
Regeneration	-0.011	-0.153	0.079	1,073	-0.130	-0.984
Participatory leadership culture	-0.212	-2.935**	-0.164	-2.255*	0.070	0.509
Individual activity	0.063	0.997	0.107	1.487	-0.157	-1.287
Know-how development	0.155	2.273*	0.076	1.052	0.376	3.318***
Control variables						
Revenue	0.104	1.780	0.265	3.263***	0.044	0.378
Number of employees	-0.113	-1.951	-0.313	-3.935***	-0.017	-0.150
Industry	0.053	0.895	0.038	0.581	0.127	1.107
F		8.759***		10.147***		11.012***
R		0.295		0.412		0.376
R^2		0.087		0.170		0.141

Sign. *** ≤ 0.001, ** 0.001 < p ≤ 0.01, * 0.01 < p ≤ 0.05

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FACILITATING INNOVATION CAPABILITY THROUGH PERFORMANCE MEASUREMENT: A STUDY OF FINNISH SMEs

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Facilitating innovation capability through performance measurement

A study of Finnish SMEs

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Abstract

Purpose – The study aims to clarify the issue of whether measurement has a positive effect on different aspects of innovation capability. The study contributes to the current understanding in two ways; first by presenting the important aspects of organisational innovation capability, and second by showing the importance of measurement in promoting different aspects of innovation capability.

Design/methodology/approach – The study has been executed by conducting a web-based survey in small- and medium-sized enterprises (SMEs). A sample of 2,400 SMEs was randomly selected. A representative of management and employees in each company received an invitation to participate in the study. A total of 311 valid responses were received.

Findings – The study contains a comprehensive description of the impacts of measurement on different aspects of innovation capability in SMEs. According to the results, performance measurement has positive effects on issues related to innovation capability. The measurement of the aspects of innovation capability is rare in SMEs, although innovation capability and measurement are positively related. The study suggests that both academics and practitioners should focus on the development of new methods and practices for measuring issues related to innovation capability in order to develop innovation capability and further contribute to firm success.

Originality/value – The paper discusses the value of measurement in a context of innovation management.

Keywords Performance measurement, Measurement, Innovation, SME, Innovation capability, Innovation management

Paper type Research paper

1. Introduction

Successful operation of organisations in almost all industries is becoming highly dependent on their ability to produce innovations. Innovation is an evolutionary process within an organisation to adopt any change pertaining to a device, system, process, policy, or service that is new to the organisation (Calantone *et al.*, 2002). Thus, innovation can be regarded as an organisational capability, because it is an act that deploys resources with a new ability to create value (Yang *et al.*, 2006). Developing innovation capability is important, as innovation plays a key role in the survival and growth of organisations (Francis and Bessant, 2005). In order to manage innovation capability, it has to be measured. Measurement can have a positive effect on many things, if the measurement is conducted in a right way (Ukko *et al.*, 2008). The importance of measurement is especially true for innovations where there is need to bring clarity to a fundamentally creative process (Skarzynski and Gibson, 2008). Traditionally, small- and medium-sized enterprises (SMEs) have little resources to measure their performance or issues related

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to innovation capability. Earlier studies have shown that the measurement of issues related to innovation capability is on a poor level in Finnish SMEs (Saunila *et al.*, 2011). Contrary to the assumption that small companies have less opportunities for innovation development, the study of Sloan and Sloan (2011) concludes that firm size does not have a significant influence at least in the generation of incremental innovations.

The objective of this research is to study the relationship between organisational innovation capability and performance measurement. The study contributes to the current understanding in the field of innovation management by presenting the important aspects of organisational innovation capability and by showing the importance of measurement in promoting different aspects of innovation capability. The results contribute to the existing discussion on measurement innovation capability by diminishing the gap between theory and practice and by building requisites for further research. The study concludes that organisations can affect their innovation capability by measurement. Both academics and practitioners should focus on the development of new methods and practices for measuring issues related to innovation capability.

The paper is organised as follows. The study consists of six sections, including the introduction, a literature review, the research methodology, the findings, discussion and conclusions. The literature review covers the concept of innovation capability, as well as performance measurement and its impacts. The research methodology includes the questionnaire design, sample and data collection, and description of the data. In the findings section, the results of statistical analyses are presented. The last two sections consist of a discussion and conclusions of the findings, and summarise the contribution of the study.

2. Literature review

2.1 Innovation capability

The term innovation capability has been defined in several ways. According to Neely *et al.* (2001), an organisation's innovation capability can be described as its potential to generate innovative outputs. Similarly, Lawson and Samson (2001) define innovation capability as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders". Innovation capability has been suggested to be a multi-faceted construct. There is no common way of analysis by which to study it, due to the variety of perspectives of innovation management (Perdomo-Ortiz *et al.*, 2006). The streams of study in the area of innovation capability have often adopted a certain type of innovation, such as product innovation, instead of the overall innovation capability (Ibrahim *et al.*, 2009). Innovation capability has also been divided into radical and incremental innovation capability (Sen and Egelhoff, 2000). According to the study of Forsman and Annala (2011) the majority of the SMEs are biased towards incremental innovation development resulting in a variety of innovation types: products, services, processes, production methods and single functions. Moreover, the current literature has concentrated on evaluating an organisation's innovation capability by defining types of capabilities that the overall innovation capability consists of. These include, for example, perspectives of product innovation capability, process innovation capability, market innovation capability, strategic innovation capability, organisational capability, manufacturing capability, networking capability, entrepreneurial capability, and R&D capability (Christensen, 1995; Guan and Ma, 2003; Wang and Ahmed, 2004; Forsman, 2009).

Another viewpoint is to point out the organisational aspects of innovation. According to Lawson and Samson (2001), innovation capability is a theoretical framework aiming to describe the actions that can be taken to improve the success of innovation activities. Sáenz *et al.* (2009) consider innovation as a dynamic capability (i.e. a capability that allows the organisation to integrate, build, and reconfigure internal and external competences in order to address rapidly changing environments (Teece *et al.*, 1997)) with multiple aspects. The aspects of innovation capability can also be considered as inputs of innovation activities. According to Davila *et al.* (2006), inputs are the resources dedicated to the creation of innovations. The inputs may be tangible, namely people, money, time, equipment, etc. or intangible, such as motivation, knowledge and organisational culture. Prajogo and Ahmed (2006) discuss the technological factors of innovation management and human factors of innovation management. Human factors include the people and social practices as ingredients in organisational success. Perdomo-Ortiz *et al.* (2006) have used a term business innovation capability to describe the critical success factors of innovation processes. These critical factors can be interpreted as business innovation capability dimensions, and thus the capability can be measured with the factors.

In this study, innovation capability is defined to consist of the drivers of successful innovation, or aspects influencing an organisation's capability to manage innovation. According to earlier literature, these aspects include for example leadership practices (Bessant, 2003; Tidd *et al.*, 2005; Perdomo-Ortiz *et al.*, 2006; Martensen *et al.*, 2007; Skarzynski and Gibson, 2008; Smith *et al.*, 2008; Paalanen *et al.*, 2009), employees' skills and innovativeness (Perdomo-Ortiz *et al.*, 2006; Martensen *et al.*, 2007; Skarzynski and Gibson, 2008; Tura *et al.*, 2008; Smith *et al.*, 2008; Paalanen *et al.*, 2009; Liu, 2009), processes and tools for idea management (Lawson and Samson, 2001; Tidd *et al.*, 2005; Skarzynski and Gibson, 2008; Smith *et al.*, 2008), supporting culture (Lawson and Samson, 2001; Tidd *et al.*, 2005; Martensen *et al.*, 2007; Skarzynski and Gibson, 2008; Smith *et al.*, 2008; Paalanen *et al.*, 2009; Liu, 2009), external sources for information (Romijn and Albaladejo, 2002; Tidd *et al.*, 2005; Perdomo-Ortiz *et al.*, 2006; Paalanen *et al.*, 2009; Laforet, 2011), development of individual knowledge (Bessant, 2003; Tidd *et al.*, 2005), employees' welfare (Laforet, 2011), and linkage to strategic goals (Bessant, 2003; Martensen *et al.*, 2007; Smith *et al.*, 2008). Also Francis and Bessant (2005) conclude that innovation capability may not be a unitary set of attributes, meaning that different aspects may be needed to create different kinds of innovations.

2.2 Performance measurement

"Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action" (Neely *et al.*, 2005). Radnor and Barnes (2007) define performance measurement as quantifying the input, output, or level of activity of an event or process. Performance measurement has traditionally concentrated on financial measures. Today, performance measurement has moved towards examining the organisation as a whole (Amaratunga and Baldry, 2002). This means that all things happening in the organisation are seen to have an impact on its performance. These things include leadership and management, employees' task motivation, the quality of operations, and the ability of products to fulfil customers' needs (Franco and Bourne, 2003; Bourne *et al.*, 2005; Bititci *et al.*, 2006). Measurement provides the basis for an organisation's assessment on how it reaches its objectives. Measurement also helps

to identify areas of weaknesses and to decide on future initiatives. Measurement is not an end in itself, rather a tool for more effective management (Amaratunga and Baldry, 2002).

According to Radnor and Barnes (2007), performance management is an action based on performance measurement, which results in improvements in behaviour, motivation and processes. Further, they consider that performance measurement is about efficiency, productivity and utilisation, whereas performance management builds on performance measurement and is concerned with effectiveness and a broader, more holistic, even qualitative view of operations and the organisation. Amaratunga and Baldry (2002) state that performance management provides organisations the opportunity to refine and improve their development activities.

2.3 Impacts of performance measurement

It is obvious that improving the innovation capability is the key to acquiring sustainable competitive advantage for an organisation. Thus, it is significant to evaluate the organisation's innovation capability accurately (Shan and Zhang, 2009). According to Skarzynski and Gibson (2008), innovation measures can help managers in two ways: first, to make informed decisions based on objective data; second, to help align goals and daily endeavours with the near- and long-term innovation agenda. Appropriate measures of performance can contribute to a significantly better understanding of innovation. Most appropriate are those measures that enable the innovation to focus (Birchall *et al.*, 2011). All in all, evaluation is an important link in the control structure of organisations (Ferreira and Otley, 2009).

The impacts of performance measurement have been studied by many researchers. According to Pavlov and Bourne (2011), the impacts of performance measurement depend on the way it is used. Performance measurement can affect an organisation's routines in three ways. Pavlov and Bourne (2011) call them as the trigger effect of measurement, the guidance effect of measurement, and the intensification effect of measurement. First, when measurement is used in its feedback-generating function, the measures communicate the results of the past execution of the routine and indicate whether its performance is adequate to the demands of the environment. Second, when measurement is used in its feed-forward function, it can affect the direction of the change in organisational processes. Third, measuring performance forces to search for a match between the existing idea and expression of the routine and stimulates the process of adjusting them in order to respond to the new demands of the environment.

A study of Ukko *et al.* (2007) concludes that performance measurement has positive impacts on leadership. A greater amount of more specific and exploitable information provides a more solid base for management-employee communication. The study also suggests that performance measurement has impacts on the different areas of management, and the impacts are positive, when performance measurement is conducted in a right way. According to Graftona *et al.* (2010), the increased use of decision-facilitating measures for feedback control may result as the organisation's greater ability to exploit existing strategic capabilities. On the other hand, the increased use of such measures for feed-forward control is connected to an organisation's capacity to identify and develop new strategic capabilities. Phusavat *et al.* (2009) have discovered a connection between the extensive use of information and communication technology and effective performance measurement. A study of de Leeuwa and van den Berg (2011)

reveals that performance management practices influence some behavioural factors, which they call understanding, motivation and focus on improvement. "Understanding" is related to understanding shop floor performance; "motivation" is related to the acceptance of performance measures by operators and motivation to realise performance and active discussion of performance; and "focus on improvement" is related to using performance management to improve within and across organisational departments. Also Ukko *et al.* (2008) have found that performance measurement has a positive impact on the employees' motivation, learning opportunities, decision-making opportunities, and achievement of goals.

Also the impacts of performance measurement systems have been the subject of many previous studies. For example, the study of Martinez (2005) presents eight positive impacts of performance measurement systems:

(1) focus people's attention on what is important to the company;
(2) get business improvement;
(3) improve customer satisfaction;
(4) increase productivity;
(5) align operational performance with strategic objectives;
(6) improve people's satisfaction;
(7) align people's behaviours towards continuous improvement; and
(8) improve company reputation.

A successfully implemented and used performance measurement system, through cultural change, leads to a more participative and consultative management style. Similarly, the correct use of performance measurement systems can lead to an achievement culture (Bititci *et al.*, 2004, 2006). Also Hall (2008) has studied the impacts of performance measurement systems on management. The results indicate that comprehensive performance measurement systems influence managers' cognition and motivation. The findings of Dumond (1994) suggest that a performance measurement system has a positive impact on an individual's performance, decision-making and job satisfaction. Similarly, Lawson *et al.* (2003) found that the performance measurement system resulted in significant improvement in employee satisfaction.

Another stream of literature suggests that performance measurement is not essential for running a well-performing organisation (Johnson and Broms, 2000). Organisations that have clear policies and actions with genuine beliefs may not benefit from formal monitoring of individual performance (Sobótka and Platts, 2010). Increased control does not lead anywhere by itself, organisations need to learn to perform, with or without measures (Bititci *et al.*, 2011).

As explained above, the objective of this study is to examine the relationship between innovation capability and performance measurement. On the basis of the studied literature, innovation capability is defined to be composed of the important aspects needed to manage innovation activities. In this study, it is argued that performance measurement plays a significant role for developing innovation capability. In other words, the current state of innovation capability is better in companies that measure it actively than in those which do not. On the basis of the findings of earlier literature, the following hypothesis was formed:

H1. The higher the firm's measurement activity, the greater its innovation capability.

3. Methodology

3.1 Questionnaire design

The approach of this study is quantitative. The questionnaire developed for the study consists of two major parts. The first part comprises 30 items measuring different issues related to innovation capability. The second part comprises nine items measuring the activity of measurement in the organisation. The items for the questionnaire were operationalised on the basis of a literature review. Some efforts were made to maximise the validity and reliability of the construct. When available and appropriate, existing measurements that had been empirically tested were utilised. New items were built on the basis of previous studies. The items were reviewed and revised with a group of researchers. The researchers were asked to critically analyse each of the items with respect to the concept it was intended to measure, on the appropriateness of each item, easiness of comprehension, and possible improvements in wording. This resulted in minor changes to the presentation of the questionnaire. The items of innovation capability and their references are presented in Table I. The scale included also nine items to measure the activity of performance measurement and the use of measurement information. The respondents were asked to respond to different questions: whether the organisation has measures for evaluating development, in which aspects of innovation capability are measured, and whether measurement information is used for developing the actions and operations of the organisation. For each of the 30 items of innovation capability and the nine items of measurement, the respondents were asked to indicate their opinion on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). A neutral response "neither disagree nor agree", was adopted to reduce uninformed responses.

3.2 Sample and data collection

The data of the study was gathered from Finnish SMEs with a web-based questionnaire. SMEs with less than ten employees were excluded from the sample. A sample of 2,400 SMEs, employing 11-249 persons and having a revenue of 2-50 Meuro, was randomly selected. The questionnaire was targeted to both SMEs, because both groups would presumably benefit from performance measurement. Also, a representative of both management and employees received an invitation to participate in the study. Thus, 4,800 questionnaires were sent. A total of 4,050 questionnaires reached the respondents, while 750 questionnaires were returned to the researchers with return to sender (RTS) messages, indicating that the addresses were no longer valid. The delivery of the questionnaire was conducted in four waves. One week after the first mailing of the questionnaire, reminder questionnaires were sent out. The remaining two reminders were sent a week after the previous reminder. This process resulted in a total of 311 responses, and after discounting the number of RTS mails, the final response rate accounted for 7.68 per cent.

To check the non-response bias, an analysis of variance (ANOVA) test was performed. The respondents were divided into four groups: the first respondents, the first follow-ups, the second follow-ups and the third follow-ups. The results of the ANOVA test revealed that there was no significant difference (at the 5 per cent

Item	Original items	References
1. My work community encourages gaining knowledge through external contacts	People in the organisation possess a willingness to accept and adopt "external" ideas	Martensen *et al.* (2007)
	We are encouraged to flush out information on what most would consider the "not so obvious" or even obscure	Dobni (2008)
2. We have developed our ways of action by comparing our operations to other organisations	Understanding competitors' core technology competence	Guan and Ma (2003)
3. We develop our actions together with our stakeholders (customers, etc.)	We co-define value with our customers	Dobni (2008)
	We generate ideas for new products and/or services with our customers	Kallio *et al.* (2012)
4. Co-operation works well in our organisation	Cooperation between different functions works well	Kallio *et al.* (2012)
5. We have a clear way of processing and developing ideas	Innovation processes are supported by sufficient tools, and systems	Martensen *et al.* (2007)
6. The employees get feedback for their ideas	We have clear feedback practices	Otala (2003)
7. Our reward system encourages ideating	My organisation recognises and rewards innovative and enterprising employees	Tang (1999)
8. Our organisation seeks new ways of action actively	I seek out new ways to do things	Hurt *et al.* (1977)
	Creating, acquiring and transferring of new knowledge and skills are a part of company culture	Martensen *et al.* (2007)
9. Our organisation has the courage to try new ways of action	We are willing to try new ways of doing things and seek unusual, novel solutions	Wang and Ahmed (2004)
10. When experimenting with new ways of action, mistakes are allowed	There is an understanding that mistakes will occur or an opportunity will not transpire as expected	Dobni (2008)
11. The employees have the courage to disagree	In our company, we tolerate individuals who do things in a different way	Wang and Ahmed (2004)
12. The managers encourage initiatives	We get a lot of support from managers if we want to try new ways of doing things	Wang and Ahmed (2004)
	My supervisor encourages me to express my opinion on things	Kallio *et al.* (2012)
13. The managers give positive feedback	Feedback is given to the individual as well as to the team concerning improvement suggestions for innovation.	Martensen *et al.* (2007)
14. The managers pass employees' ideas to the upper levels of the organisation	Our management helps break down barriers that stand in the way of implementation	Dobni (2008)
	Important information is shared quickly and accurately to the right persons – up, down and sideways in the organisation	Martensen *et al.* (2007)
15. The managers participate in ideation and development	Our top managers show great enthusiasm for innovation and work improvement	Tang (1999)
16. The employees are willing to participate in development	In my organisation employees are active in making suggestions about work improvement	Tang (1999)
	I participate in the organisation's innovation activities	Kallio *et al.* (2012)

(*continued*)

Table I.
Original references of the items

Item	Original items	References
17. It is easy for the employees to adopt new ways of action	I am reluctant about adopting new ways of doing things until I see them working for people around me	Hurt *et al.* (1977)
18. The employees know-how to be critical towards current ways of action when needed	I am encouraged to challenge decisions and actions in this organisation if I think there is a better way	Dobni (2008)
19. All employees have a possibility for education	We have an organisation-wide training and development process, including career path planning, for all our employees	Samson and Terziovski (1999)
20. We have instructions and responsible persons for work orientation	We have instructions and responsible persons for work orientation	Otala (2003)
21. The employees are encouraged to be multi-skilled	The employees are encouraged to be multi-skilled	Otala (2003)
22. Voluntary learning and development of expertise are supported in our organisation	Voluntary learning and development of expertise are supported in our organisation	Otala (2003)
23. There are practices for transferring tacit knowledge	There are practices for transferring tacit knowledge	Otala (2003)
24. In our organisation, learning is an investment, not an expense	The sense around here is that employee learning is an investment, not an expense	Calantone *et al.* (2002)
25. The employees prosper in our organisation	Employee satisfaction is formally and regularly measured	Samson and Terziovski (1999)
26. The employees are treated equally	Employees are treated as equals amongst peers, and this is evident in their participation levels	Dobni (2008)
27. The employees are appreciated for their work	My contributions are valued by my fellow employees	Dobni (2008)
28. The number of working tasks is suitable	My work schedule allows me time to think of creative solutions to problems	Tang (1999)
29. The quality, demands and responsibility of tasks are suitable	The quality, demands and responsibility of tasks are suitable	Otala (2003)
30. There is an opportunity for flexible working and working hours in our organisation	There is an opportunity for flexible working and working hours in our organisation	Otala (2003)

Table I.

significance level) between the four groups. Therefore, it can be assumed that the responses reflect the whole sample well.

3.3 Description of the data

The background information of the respondents is presented in Table II. In terms of organisational size based on the number of employees, 72 per cent of the respondents came from firms with 49 employees or less, and around 28 per cent were from firms with 50-249 employees. Based on revenue, around 45 per cent of the respondents were from firms with 2-5 Meuro revenue, around 43 per cent from firms with 5-20 Meuro revenue, and around 11 per cent from firms with 20-50 Meuro revenue. The division of responses depending on the revenue and number of employees are well in line with the

	n	%
Revenue (Meuro)		
2-5	141	45.3
5-20	135	43.4
20-50	35	11.3
No. of employees		
10-49	224	72.0
50-249	87	28.0
Industry		
Industrial	145	46.6
Service	159	51.1
No response	7	2.3
Organisational position		
Executive	222	71.4
White-collar worker	68	21.9
Blue-collar worker	12	3.9
No response	9	2.9

Table II. Background information of the respondents

total of Finnish SMEs. As can be seen, the responses are quite nearly equal between industrial and service sectors. A majority of the responses were received from executives, and about 30 per cent of the responses were from employees.

4. Findings

To analyse the collected data, factor analysis was used to extract the underlying factors of innovation capability. The adequacy of the sample was checked with the Kaiser-Meyer-Olkin (KMO) test. The overall KMO value was 0.87, which is acceptable for this type of analysis. Then, construct validity was assessed by principal component analysis with Varimax rotation. One item was excluded, because it loaded alone among other items into one factor. Seven factors (based on eigenvalue greater than 1) were obtained (Table III) with the factor analysis. This solution explained 58.2 per cent of the total variance. The seven factors extracted on the basis of this solution are:

(1) *Participatory leadership culture factor*. The first factor comprises six items. This first factor includes a set of items directly or indirectly related to an organisational culture that supports innovation. The dimension reflects both the overall atmosphere of the organisation that supports and motivates innovation, and also a leadership culture that facilitates innovation. The items of the factor are: "the managers encourage initiatives", "the managers give positive feedback", "the managers pass employees' ideas to the upper levels of the organisation", "the managers participate in ideation and development", "there are practices for transferring tacit knowledge" and "the employees are appreciated for their work". The factor explains 28.2 per cent of the variance.

(2) *Ideation and organising structures factor*. The second factor also comprises six items. This factor includes a set of items directly related to the structures and systems that successful innovation requires. This includes the generation, development and implementation of innovations, and the ways how the work tasks of the organisation are organised. The six items of the factor are: "we have

Cronbach's α	Factor 1 0.803	Factor 2 0.708	Factor 3 0.786	Factor 4 0.738	Factor 5 0.766	Factor 6 0.625	Factor 7 0.486	Comm.
12	0.698							0.584
13	0.702							0.631
14	0.705							0.648
15	0.756							0.677
23	0.404							0.350
27	0.469		0.442					0.565
5		0.688						0.673
6		0.517						0.532
7		0.556						0.573
20		0.497						0.461
28		0.514						0.436
29		0.574						0.469
4			0.491					0.550
11	0.416		0.476					0.537
21	0.429		0.496					0.512
25			0.768					0.682
26			0.731					0.687
19				0.737				0.634
22				0.711				0.642
24				0.655				0.618
8					0.676			0.661
9					0.742			0.671
10					0.740			0.672
1					0.442	0.592		0.563
2						0.797		0.712
3						0.726		0.590
16							0.697	0.562
17							0.654	0.526
18							0.550	0.473
Eigenvalue	8.196	1.966	1.694	1.389	1.261	1.229	1.154	
% of variance explained	28.262	6.778	5.843	4.790	4.349	4.239	3.981	
Cumulative	28.262	35.040	40.883	45.673	50.022	54.260	58.241	

Table III.
Factor analysis results (loadings over 0.4 presented)

Notes: Principal component analysis – varimax rotation; KMO measure of sampling adequacy 0.878

a clear way of processing and developing ideas", "the employees get feedback for their ideas", "our reward system encourages ideating", "we have instructions and responsible persons for work orientation", "the number of working tasks is suitable" and "the quality, demands and responsibility of tasks are suitable". The factor explains 6.78 per cent of the variance.

(3) *Work climate and well-being factor*. The third factor comprises five items. This factor includes the items that represent the well-being of the employees and further the work climate for innovation development, including collaboration and values. The five items of the factor are: "co-operation works well in our organisation", "the employees have the courage to disagree", "the employees are encouraged to be multi-skilled", "the employees prosper in our organisation" and "the employees are treated equally". The factor explains 5.84 per cent of the variance.

(4) *Know-how development factor*. The fourth factor comprises three items. This factor concludes that also the expertise of the employees play an important role for the development of the innovation capability of the organisation. This includes the utilisation of knowledge as well as the improvement of employee skills. The three items of the factor are: "all employees have a possibility for education", "voluntary learning and development of expertise are supported in our organisation" and "in our organisation, learning is an investment, not an expense". The factor explains 4.79 per cent of the variance.

(5) *Regeneration factor*. The fifth factor also comprises three items. This factor includes items that measure the organisation's ability to learn from earlier experience and to use that experience to create innovations and develop their operations. The items of the factor are: "our organisation seeks new ways of action actively", "our organisation has the courage to try new ways of action" and "when experimenting with new ways of action, mistakes are allowed". The factor explains 4.35 per cent of the variance.

(6) *External knowledge factor*. Also the sixth factor is comprises three items. This factor clearly underlines the importance of exploiting external networks and knowledge to the overall organisational innovation capability. The three items of the factor are: "my work community encourages gaining knowledge through external contacts", "we have developed our ways of action by comparing our operations to other organisations" and "we develop our actions together with our stakeholders (customers, etc.)". The factor explains 4.24 per cent of the variance.

(7) *Individual activity factor*. The seventh factor also comprises three items. This factor expresses that the employees' individual innovation capability and activity is needed to form the organisation's overall innovation capability. This factor takes into account the characteristics associated to higher innovation capability and the motivation of the employees. The three items of the factor are: "the employees are willing to participate in development", "it is easy for the employees to adopt new ways of action" and "the employees know-how to be critical towards current ways of action when needed". The factor explains 3.98 per cent of the variance.

To test the reliability of the results, a Cronbach's α test was performed. The α value of six factors, as shown in Table III, are greater than 0.60. In one factor (individual activity) the α value is less than 0.50, which indicates that the reliability of the factor can be questioned, and therefore the results concerning the factor should be handled circumspectly. The overall α value of the remaining 29 items is 0.903. The overall reliability of the construct is therefore supported.

Also the nine items of measurement were subjected into principal component analysis to test the unidimensionality of the constructs and to eliminate unreliable items. The results of the analysis suggest that the standardized loadings are highly significant for the items, suggesting that the underlying construct is valid.

Table IV presents the means, standard deviations (SD) and intercorrelations of the variables used in this study. It was found that measurement had significant and positive correlations with the aspects of innovation capability. In order to assess the extent of multicollinearity, the variance inflation factor (VIF) was computed.

	Mean	SD	1	2	3	4	5	6	7
1. External knowledge	3.96	0.733	1.000						
2. Work climate and well-being	3.94	0.597	0.285***	1.000					
3. Ideation and organising structures	3.45	0.628	0.269***	0.494***	1.000				
4. Regeneration	3.80	0.784	0.405***	0.370***	0.394***	1.000			
5. Participatory leadership culture	3.65	0.613	0.271***	0.533***	0.504***	0.508***	1.000		
6. Individual activity	3.59	0.612	0.194***	0.400***	0.293***	0.391***	0.409***	1.000	
7. Know-how development	3.76	0.783	0.251***	0.469***	0.449***	0.361***	0.427***	0.274***	1.000
8. Measurement	3.19	0.719	0.257***	0.359***	0.558***	0.364***	0.398***	0.261***	0.408***

Table IV.
Means, SD and intercorrelations of the variables

Note: Significant at: $^{*}0.01 < p \leq 0.05$, $^{**}0.001 < p \leq 0.01$ and $^{***} \leq 0.001$

The VIFs ranged from 1.015 to 1.382, which are significantly below the cut-off value of 10, and therefore it is suggested that multicollinearity is not a problem.

The hypothesis was tested by using the linear regression method. The analyses were conducted on each innovation capability dimension. Three control variables that might affect an organisation's innovation capability were included: the industry and firm size (measured by both revenue and number of employees). A dummy variable was used for the industry, divided into manufacturing and service industries. The results reported in Tables V and VI support the hypothesis. Measurement is significantly and positively related to different aspects of innovation capability. Measurement has the strongest impact on ideation and organising structures and know-how development. However, the significance is strong in all aspects of innovation capability.

The regression model (Table V), studying the relationship between measurement and ideation and organising structures, is significant ($F = 34.832$, sig. 0.000). The adjusted R^2

	Ideation and organising structures		Know-how development		Participatory leadership culture	
Dependent variables	β	t	β	t	β	t
Independent variable						
Measurement	0.586	11.795***	0.495	9.606***	0.445	8.241***
Control variables						
Revenue	−0.015	−0.254	0.043	0.721	−0.141	−2.268*
No. of employees	−0.060	−1.034	−0.182	−3.044**	−0.075	−1.201
Industry	0.029	0.578	0.205	4.004***	−0.063	−1.177
F		34.832***		27.559***		19.106***
R		0.579		0.534		0.466
R^2		0.335		0.285		0.217

Table V.
Regression results of dependent variables

Note: Significant at: $^{*}0.01 < p \leq 0.05$, $^{**}0.001 < p \leq 0.01$ and $^{***} \leq 0.001$

Dependent variables	Work climate and well-being		Regeneration		Individual activity		External knowledge	
	β	t	β	t	β	t	β	t
Independent variable								
Measurement	0.415	7.481***	0.390	6.973***	0.282	4.849***	0.252	4.281***
Control variables								
Revenue	−0.009	−0.144	−0.088	−1.365	−0.037	−0.550	−0.018	−0.270
No. of employees	−0.058	−0.899	0.049	0.749	−0.041	−0.610	0.065	0.946
Industry	−0.025	−0.458	0.042	0.758	0.120	2.068*	−0.007	−0.113
F		14.129***		12.936***		6.920***		5.273***
R		0.412		0.397		0.302		0.266
R^2		0.170		0.158		0.091		0.071

Note: Significant at: *$0.01 < p \leq 0.05$, **$0.001 < p \leq 0.01$ and *** ≤ 0.001

Table VI.
Regression results of dependent variables

is 0.335, meaning that 33.5 per cent of the variance in the dependent variable (ideation and organising structures) can be explained by measurement and control variables. The standardised β of measurement is 0.586 and is significant (sig. 0.000). The results indicate that performance measurement tends to be positively related to ideation and organising structures, which is consistent with the hypothesis. No significant differences were found in control variables as regards the ideation and organising structures.

When checking the relationship between know-how development and performance measurement, the following was found: the regression model (Table V) is significant ($F = 27.559$, sig. 0.000), with 28.5 per cent of the variance explained; the standardised β is 0.495 and significant (sig. 0.000). Therefore, the results reveal a positive relationship between measurement and know-how development. An analysis of the impact of the control variables in the relationships between measurement and know-how development was also done. When checking the impact of the control variables (size of the company by revenue and number of employees and industry), a negative association between the number of employees and know-how development was found. Also the type of industry was found to have an effect; service-oriented companies pay more attention to know-how development than industry-oriented companies.

The regression model (Table V) concentrating on participatory leadership culture is significant ($F = 19.106$, sig. 0.000). The adjusted R^2 is 0.217, meaning that 21.7 per cent of the variance in the dependent variable (participatory leadership culture) can be explained by the measurement and control variables. The standardised β is 0.445 and significant (sig. 0.000). Therefore, the hypothesis is also supported by the model, showing that measurement tends to be positively associated with participatory leadership culture. The results show that the size of the company (measured by revenue) also seems to be related to participatory leadership culture. Companies with higher revenue apply less participatory leadership culture than companies with lower revenue. This may be a consequence of the fact that in small companies the management is more involved in daily routines than in bigger companies.

The regression model (Table VI) investigating the relationship between work climate and well-being and performance measurement is significant ($F = 14.129$, sig. 0.000). The adjusted R^2 is 0.170, which shows that the model has a 17.0 per cent of the total

variation in the dependent variable (work climate and well-being). The standardised β is 0.415 and significant (sig. 0.000). The results indicate that performance measurement tends to be positively related to the work climate and well-being, which is also consistent with the hypothesis. The control variables were not found to be influential.

The next model, presented in Table VI, investigates the effects of measurement to regeneration of a firm. This model is significant (sig. 0.000) with F statistics (= 12.936). The adjusted R^2 indicates that 15.8 per cent of the variation in regeneration is explained by the measurement and control variables. The standardised β of measurement is 0.390 and significant (sig. 0.000). The results indicate that performance measurement has a positive effect on regeneration, which is consistent with the hypothesis. No significant differences were found in the control variables as regards regeneration.

Also the individual activity of the employees was found to be positively associated with measurement (Table VI). The regression model is significant ($F = 6.920$, sig. 0.000). However, the adjusted R^2 is only 0.091, meaning that only 9.1 per cent of the variance in the dependent variable (individual activity) can be explained by performance measurement and control variables. The standardised β is 0.62 (sig. = 0.000) for measurement, and the industry also has an influence on the individual activity. The employees of service-oriented companies tend to be more active as regards the activity of innovation. The other control variables were not found to be influential.

The regression model (Table VI) investigating the relationship between external knowledge and performance measurement is significant ($F = 5.273$, sig. 0.000). However, the adjusted R^2 indicates that only 7.1 per cent of the variation in exploitation of external knowledge is explained by measurement and control variables. The standardised β of measurement is 0.252 and significant (sig. 0.000). The results indicate that performance measurement tends to be positively related to exploitation of external knowledge, at least to some extent. This is also consistent with the hypothesis. No significant differences were found in control variables as regards the exploitation of external knowledge.

It can be concluded from the regression results that the seven aspects of innovation capability can be influenced by performance measurement. The state of ideation and organising structures, know-how development and participatory leadership culture are most subject to performance measurement. It also can be noted that other than these three aspects of innovation capability can be affected by measurement at least to some extent. Only a little effect was discovered at the control variables, apart from know-how development, where both size and industry (together with measurement) affect the current state of know-how development.

5. Discussion

The results of the study present some novel insights regarding the concept of innovation capability and the role of performance measurement when managing innovation capability. There is a common consensus among researchers that innovation capability should consist of all the essential aspects that facilitate innovation activities in organisations (Teece *et al.*, 1997; Lawson and Samson, 2001; Perdomo-Ortiz *et al.*, 2006; Sáenz *et al.*, 2009). However, many of the earlier definitions of innovation capability are based on theoretical considerations, and there is no common way of analysis by which to study it, due to the variety of perspectives of innovation management (Perdomo-Ortiz *et al.*, 2006). Further, most studies in the area of innovation capability

have adopted a certain type of innovation, such as product innovation, instead of the overall innovation capability (Ibrahim *et al.*, 2009). In the current research, a wide range of different items of innovation capability was examined, aiming to define an overall innovation capability. Based on explorative factor analysis, seven factors of innovation capability were found. The study thus contributes to the fragmented literature of innovation capability by presenting an overall definition of innovation capability including the aspects of participatory leadership culture, ideation and organizing structures, work climate and well-being, know-how development, regeneration, external knowledge, and individual activity. The study contributes to the current understanding by diminishing the gap between theory and practice, when a majority of the studies that have tried to capture the aspects of innovation capability as a whole, are theoretical.

The study also investigated the relationship between innovation capability and performance measurement. The findings contribute to the current theory by indicating that all the seven aspects of innovation capability are dependent on the state of measurement. This is in line with the major stream of the studies of the impacts of performance measurement, and for example the studies of Ukko *et al.* (2007, 2008), Graftona *et al.* (2010), and Pavlov and Bourne (2011) indicate a positive relationship between performance measurement and most of the aspects of innovation capability included in this study. However, the role of performance measurement is never unambiguous, and the more the measurement is focused on individual performance, the more difficult it is to show the benefits (Sobótka and Platts, 2010). According to Neely and Bourne (2000), people can far too often recollect examples where senior management has used measurement data to score points over other managers and illustrate why they have failed to perform. In such organisations, especially where there is a culture of blame, measurement becomes almost impossible because nobody really wants measurement data to become available. Most of the studied seven aspects of innovation capability are related to individual performance, which should be taken into account when measuring them. For example, understanding shopfloor performance, the acceptance of performance measures by operators, the motivation to realise performance together with active discussion of performance, and "focus on improvement" are related to using performance management to improve within and across organisational departments (de Leeuwa and van den Berg, 2011). The findings of Bourne *et al.* (2002) and Franco and Bourne (2003) highlight that a paternalistic culture that encourages actions and improvement and does not punish for errors will lead to successful implementation and use of a performance measurement system. The positive relationship between performance measurement and innovation capability may indicate that at least some of the features presented above exist in the studied companies. However, further investigation is needed to clarify how the measurement of innovation capability is put into practice in the studied companies. The low level of measurement of innovation capability (Table IV) indicates that more sophisticated methods are needed. This is supported by Sobótka and Platts (2010), who state that formal monitoring is not enough. The data should be analysed and utilised, and the organisations need to learn to perform with or without measures (Bititci *et al.*, 2011). This is also the case with the measurement of innovation capability. The managerial perspective should not be forgotten.

Regarding the managerial implications of the study, it can be stated that the overall definition of innovation capability provides a solid starting point for the development of different aspects of innovation capability. It is difficult to think of a situation where

an organisation could develop their know-how and individual activity by ignoring for example the aspect of work climate and well-being. Organisations can start the development for example by making a diagnosis of the different aspects of innovation capability, after which they can decide what the most important aspects of development are. After this decision, the measurement could focus on these aspects, not forgetting the complexity of performance measurement.

Finally, as hypothesised, the relationship between measurement and innovation capability is positive and significant, and therefore the organisational innovation capability can be enhanced by measuring it. As such, organisations should pay attention to the development of the measurement of issues related to innovation capability to benefit from their overall innovation capability.

6. Conclusions

The study contributes to the literature of innovation capability by presenting an overall definition of innovation capability that consists of seven aspects: participatory leadership culture, ideation and organising structures, work climate and well-being, know-how development, regeneration, external knowledge, and individual activity. The study diminishes the gap between theory and practice, when a majority of the studies that aim to capture the aspects of innovation capability as a whole, are theoretical. This study has shown that organisations can affect their innovation capability by measurement. According to the results, performance measurement has a positive impact on all seven aspects related to innovation capability described in this study. Therefore, innovation capability can be improved by measuring it. Despite this finding, the managerial aspect of performance measurement and the complexity of performance measurement cannot be ignored. The study suggests that both academics and practitioners should focus on the development of new methods and practices for measuring issues related to innovation capability. In addition, this study caters to various aspects of innovation capability, departing from the majority of existing studies that focus on one or two aspects of innovation capability. Therefore, the study contributes to the current understanding by presenting aspects of innovation capability that can be supported by performance measurement. The relationship between innovation capability and measurement is challenging, but the results of the study provide a good starting point for in-depth studies of the subject.

This study has some limitations which should be acknowledged. Finnish SMEs employing 11-249 persons and having a revenue of 2-50 Meuro were the target of the study. On the basis of the response rate, it can be assumed that the results reflect the whole sample well and therefore the results can be generalised to SMEs at least in Finland. However, micro companies were excluded from the sample, and more research is needed to investigate whether the results are supported in the context of micro companies as well. Second, this study has shown a positive relationship between innovation capability and performance measurement, but it has not dealt with the type of measurement needed to enhance innovation capability. As revealed in the study of Pavlov and Bourne (2011), the impacts of performance measurement depend on the way it is used. The current study has not paid attention to the way measurement is used to achieve higher innovation capability. Therefore, more research is needed to capture the linkage between innovation capability and performance measurement in detail. Third, the measurement of aspects related to innovation capability seems to be rare in SMEs.

However, the measurement has an effect on the state of innovation capability, and more attention should be paid to the measurement actions to develop innovation capability.

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PUBLICATION IV:

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RELATIONSHIP BETWEEN INNOVATION CAPABILITY AND PERFORMANCE: THE MODERATING EFFECT OF MEASUREMENT

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The relationship between innovation capability and performance

The moderating effect of measurement

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Abstract

Purpose – The purpose of this paper is to discuss whether performance measurement moderates the relationship between innovation capability and firm performance.
Design/methodology/approach – The study was conducted through a web-based survey in small- and medium-sized enterprises (SMEs). A total of 311 responses were received from a sample of 2,400 randomly selected SMEs.
Findings – Consistent with predictions, the link between innovation capability and firm performance is significant in the presence of performance measurement. Performance measurement can thus be used as a tool for improving the performance of SMEs through innovation capability.
Practical implications – Using the results of this study, practitioners can improve their innovation capability through performance measurement by taking better account of various aspects.
Originality/value – Previous research has studied the effects of performance measurement, but not in the area of innovation management. Previous research has also showed that measurement has positive effects on innovation capability. The present study goes one step further by investigating the impacts of measurement on the relationship of multiple aspects of innovation capability and firm performance.

Keywords Performance, Innovation, SME, Performance measurement, Performance management, Innovation capability
Paper type Research paper

1. Introduction

A firm's capability to produce innovations has been suggested to be crucial for its success. An innovation can be a new product or service, a new production process, or a new structure or administrative system (Hult *et al.*, 2004). Since innovation capability is typically viewed as a multifaceted construct, there is no common way to study it, due to the variety of perspectives of innovation management (Perdomo-Ortiz *et al.*, 2006). Thus, the term "innovation capability" has been defined in several ways. According to Neely *et al.* (2001), an organization's innovation capability can be described as its potential to generate innovative outputs. Lawson and Samson (2001) define innovation capability in closer detail as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders." In addition, innovation capability varies from firm to firm and is determined by multiple factors (Silva *et al.*, 2012).

The majority of previous studies in the area of innovation capability define it according to a categorization of different types of innovations. However, Rosenbusch *et al.* (2011) argue that small- and medium-sized enterprises (SMEs) benefit significantly more from a strategic innovation orientation than from just focussing on developing

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innovative products. This finding suggests that focussing solely on delivering innovative offerings to the marketplace might not fully leverage the potential of innovation. SMEs can benefit even more if they develop, communicate, and embrace an innovation orientation (Rosenbusch *et al.*, 2011). Innovation-oriented SMEs have somewhat better opportunities to succeed also financially (cf. Saunila, 2013). There is a research that suggests that innovation capability and performance are connected to each other (cf. Calantone *et al.*, 2002; Bowen *et al.*, 2010), but whether the relationship can be facilitated through performance measurement has remained unsolved.

The objective of this research is to study whether measurement moderates the relationship between organizational innovation capability and firm performance. The study contributes to the current understanding by presenting the effects of measurement on the relationship between different aspects of organizational innovation capability and firm performance in the context of SMEs. Previous research has studied the effects of performance measurement, but not in the area of innovation management. According to Skarzynski and Gibson (2008), measurement is especially important for innovations, where there is a need to bring clarity to a fundamentally creative process. A study by Saunila and Ukko (2011) showed that measurement has positive effects on innovation capability. The present study goes one step further by investigating the impacts of measurement on the relationship of multiple aspects of innovation capability and firm performance. The results contribute to the existing discussion on the innovation capability-performance relationship by presenting the effects of measurement on the relationship, thus diminishing the gap between theory and practice, and by building requisites for further research.

2. Literature review

2.1 Innovation capability

A company's innovation capability can be described at several different levels and from several different perspectives (Olsson *et al.*, 2010). Akman and Yilmaz (2008) define innovative capability as an important factor that facilitates an innovative organizational culture, the characteristics of internal promoting activities, and the capabilities of understanding and responding appropriately to the external environment. A firm's innovation capability can also be described as its ability to develop innovations continuously as a response to a changing environment (Olsson *et al.*, 2010). Tuominen and Hyvönen (2004) suggest that the organizational innovation capability should be split into two separate entities: managerial innovation and technological innovation. Martínez-Román *et al.* (2011) divide innovation capability into three factors: knowledge, organization, and human factors, which all have a managerial innovation point of view. Another approach is to discuss the technological factors of innovation management and the human factors of innovation management (Prajogo and Ahmed, 2006). Human factors include people and social practices as ingredients in organizational success. In addition, the term "business innovation capability" has been used to describe the critical success factors of innovation processes (Perdomo-Ortiz *et al.*, 2006). These critical factors can be interpreted as business innovation capability dimensions; thus, the capability can be measured with the factors.

It has been stressed that the way toward organizational innovation does not have a unique imprinting, but it is likely to be a mixture of wise managerial initiatives, direct and indirect worker participation, and cooperative industrial relations (Mazzanti *et al.*, 2006). Similarly, in this study, innovation capability is defined as consisting of the

determinants influencing an organization's capability to manage innovation. A body of literature has identified these determinants shared by innovative organizations (cf. Lawson and Samson, 2001; Romijn and Albaladejo, 2002; Bessant, 2003; Tidd *et al.*, 2005; Perdomo-Ortiz *et al.*, 2006; Martensen *et al.*, 2007; Skarzynski and Gibson, 2008; Smith *et al.*, 2008; Tura *et al.*, 2008; Paalanen *et al.*, 2009; Laforet, 2011; Saunila and Ukko, 2011). In accordance with the earlier literature and the previous study of Saunila and Ukko (2011), innovation capability has been divided into seven determinants in this study: participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity. In this study, participatory leadership culture refers to the actions and perquisites created by the managers that facilitate and motivate innovation. Ideation and organizing structures related to the structures and systems that successful innovation requires, meaning the generation, development and implementation of innovations, and the ways how the work tasks of the organization are organized. Work climate and wellbeing represent the wellbeing of the employees and further the work climate for innovation development. Know-how development refers to the development of employee skills and knowledge that are needed in developing innovation capability. External knowledge aspect highlights the importance of the proper behavior of exploiting external networks and knowledge to the overall organizational innovation capability. Regeneration means an organization's ability to learn from earlier experience and to use that experience to create innovations and develop their operations. Also employees' individual activity in developing innovations is needed to form the organization's overall innovation capability.

2.2 Innovativeness and performance

Innovativeness is an important determinant of an organization's performance (Calantone *et al.*, 2002; Hult *et al.*, 2004). Thus, organizational performance can be improved through technical and administrative innovation besides other factors (Lloréns Montes *et al.*, 2005). Previous research has studied the effects of innovations and innovativeness on organizational performance (cf. Calantone *et al.*, 2002; Cainelli *et al.*, 2004; Keskin, 2006; Bowen *et al.*, 2010; Rheea *et al.*, 2010; Gunday *et al.*, 2011; Jiménez-Jiménez and Sanz-Valle, 2011). Innovating firms have been found to have higher levels of productivity and economic growth than non-innovating firms (Cainelli *et al.*, 2004). Not only technical innovations but also organizational innovations are essential conditions for improving performance and for increasing the firm's value (Lloréns Montes *et al.*, 2005; Bowen *et al.* 2010). Organizational innovations not only prepare a suitable milieu for the other innovation types, but also have a strong and direct impact on innovative performance (Gunday *et al.* 2011). In addition, a firm's overall performance and organizational innovations are strictly and positively related to each other (Mazzanti *et al.*, 2006). Thus, managers should recognize and manage the innovations in order to boost their operational performance (Gunday *et al.*, 2011).

2.3 The moderating effect of measurement

Previous research has presented the impacts of performance measurement (Ukko *et al.*, 2008; Grafton *et al.*, 2010; de Leeuwa and van den Berg, 2011; Kohlbacher and Gruenwald, 2011; Teeratansirikool *et al.*, 2013). Performance measurement means quantifying the input, output, or level of activity of an event or process (Radnor and Barnes, 2007). It has been suggested that effective use of performance measures guide managers' behaviors toward enhancing critical aspects of firm outcomes such as profit,

cash flow, new product development, and personnel development (Teeratansirikool *et al.*, 2013). Measurement can have impacts on, for example, the exploitation of external capabilities (Grafton *et al.*, 2010); behavioral factors of a firm, namely, understanding, motivation, and focus on improvement (de Leeuwa and van den Berg, 2011); or the employees' motivation, learning opportunities, decision-making opportunities, and achievement of goals (Ukko *et al.*, 2008). In addition, the impacts of performance measurement depend on the way it is used (Pavlov and Bourne, 2011). Performance measurement can affect an organization's routines in three ways: Pavlov and Bourne (2011) call them the trigger effect of measurement, the guidance effect of measurement, and the intensification effect of measurement. First, when measurement is used in its feedback-generating function, the measures communicate the results of the past execution of the routine and indicate whether its performance is adequate to the demands of the environment. Second, when measurement is used in its feed-forward function, it can affect the direction of the change in organizational processes. Third, measuring performance forces managers to search for a match between the existing idea and expression of the routine, stimulating the process of adjusting the two parts of the routine in order to respond to the new demands of the environment.

In addition, the moderating effects of performance measurement have been studied. According to Bourne *et al.* (2003), performance measurement has an impact on the environment in which it operates. Starting to measure as well as deciding what to measure, how to measure, and what the targets will be are all acts that influence individuals and groups within the organization. Once measurement has started, the performance review will have consequences, as will the actions agreed upon as a result of that review. Performance measurement is, therefore, an integral part of the management planning and control system of the organization being measured. The alignment between performance measures and strategy has also been found to affect performance. A study of van der Stede *et al.* (2006) found that the pairing of quality-based manufacturing strategies with the extensive use of subjective non-financial performance measures had a positive performance effect. The relationship between product innovation and performance has also been found to be more positive the more interactively management control systems are used. The more interactively the managers use formal management control systems, the greater the positive effects of product innovation on performance are (Bisbe and Otley, 2004). Moreover, performance management has been found to mediate the relationship between management innovations and organizational performance (Walker *et al.*, 2011).

2.4 Research model and hypotheses

A great number of studies focussing on the innovation-performance relationship provide a positive appraisal of higher innovativeness resulting in increased corporate performance (Gunday *et al.*, 2011). However, there is a lack of studies investigating the moderating effect of measurement in the relationship between innovation capability and performance. The positive impacts of measurement have also been studied previously, but the studies often focus only on the positive impacts of measurement. In addition, previous studies focussing on innovation measurement have discussed the ways of measurement in innovation capability and innovation outputs rather than considering measurement as a moderator in the relationship between innovation capability and outputs. Thus, the purpose of this study is to explore the impact of measurement on the relationship between innovation capability and firm performance within the context of SMEs. Measurement refers to the process of quantifying the level

of action, which is in this research focussed on innovation capability. The theoretical review discussed in previous sections led to the research framework presented in Figure 1.

A quantitative design is used to determine whether there exists a moderating effect of measurement on the relationship between the determinants of innovation capability: namely, participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, individual activity, and firm performance. The presumption is that the determinants of innovation capability have an effect on performance and this effect is stronger in the presence of measurement. Thus, based on the review of past literature on effects on measurement, the following seven hypotheses can be presented.

For example Bititci *et al.* (2006) have discovered that a successfully implemented and used performance measurement, through cultural change, leads to a more participative, and consultative management style. Also Hall (2008) has studied the impacts of performance measurement systems on management and concluded that measurement influence managers' cognition and motivation. This also may result more active participation of managers. Measurement assists the leadership culture to become more participative. Thus, the following hypothesis can be formulated:

H1. Measurement moderates the relationship between participatory leadership culture and firm performance.

Measurement can also be used for coordinating activities within and among departments and thus help improving cooperation and coordination among people within the organization (Franco-Santos *et al.*, 2012). Cruz *et al.* (2011) find that reorganizing measurement fostered generating new ideas, products and ways of working. Marginson (2002) discovered that the interactive use of measurement can enhance the development of new ideas and thus improve innovation. Thus, ideation and general organization of operations can be facilitated through measurement. The hypothesis is as follows:

H2. Measurement moderates the relationship between ideation and organizing structures and firm performance.

Bititci *et al.* (2006) observe that the successful implementation and use of measurement leads to cultural change. There also results in the literature about beneficial effects of

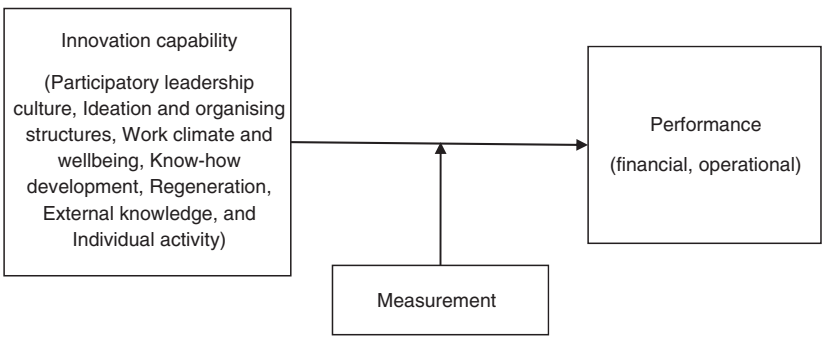

Figure 1.
Research model and hypotheses

measurement on greater knowledge exchange among employees (Groen *et al.*, 2012) and on communication and dialogue at all levels of organization (Tuomela, 2005; Henri, 2006). These may result in enhancement of organizational climate through measurement. The hypothesis is:

H3. Measurement moderates the relationship between work climate and wellbeing and firm performance.

The review study of Franco-Santos *et al.* (2012) has discovered that measurement may have an impact on learning. Ukko *et al.* (2007) observe that the use of measurement improves the quality and content of the conversations managers have with employees, brings about new routines and enhances information sharing. It has also been shown that the interactive measurement enhances organizational learning (Henri, 2006) and thus know-how in organizations. Developing know-how can be assisted by measurement. Based on the above, the hypothesis is as follows:

H4. Measurement moderates the relationship between know-how development and firm performance.

Based on Groen *et al.* (2012) measurement enabled employees to create new knowledge. In addition, the correct use of measurement can lead to an achievement culture (cf. Bititci *et al.*, 2006). The feedback use of performance measures significantly supports the exploitation of current capabilities, while the feed-forward use of performance measures supports the search for and identification of new capabilities (Grafton *et al.*, 2010). All these effects of measurement are connected to regeneration. Thus, the following hypothesis can be formulated:

H5. Measurement moderates the relationship between regeneration and firm performance.

Measurement can help improving coordination outside the organization with its partners (Franco-Santos *et al.*, 2012). Henri (2006) shows that the interactive measurement fosters firm's orientation toward market requirements. Thus measurement assists the firm behavior of acquiring and exploiting information outside the firm. The hypothesis is as follows:

H6. Measurement moderates the relationship between external knowledge and firm performance.

The performance measurement system may also have a positive impact on an individual's performance and employee satisfaction (Lawson *et al.*, 2003). In addition, the review study of Franco-Santos *et al.* (2012) reveal that measurement can have effect on employees' motivation, although it is dependent on the way measurement is used. Proper measurement can thus be used for increasing employees' activity. Based on the above, the hypothesis is as follows:

H7. Measurement moderates the relationship between individual activity and firm performance.

3. Methodology

3.1 Variables

3.1.1 Independent variables. The independent variables of the study are participatory leadership culture, ideation and organizing structures, work climate and wellbeing, know-how development, regeneration, external knowledge, and individual activity. Each of these variables was measured by a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A neutral response – "neither disagree nor agree" – was adopted to reduce uninformed responses. Whenever possible, established scales were utilized. When the items had to be modified, the items were derived from the literature. The number of items in each variable and their references are presented in Table I.

3.1.2 Moderator variable. There was no comprehensive scale on which to measure measurement related to innovation capability, therefore the items used had to be developed first. The items were rooted in literature. The moderator variable was measured by nine items (Table I). The respondents were asked to respond to different questions: whether the organization has measures for evaluating development (one item), which aspects of innovation capability are measured (seven items), and whether measurement information is used for developing the actions and operations of the organization (one item). In this case, once again, a five-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree), was utilized.

3.1.3 Dependent variable. According to Bueno *et al.* (2010), the literature has established a high correlation between objective and subjective data on performance; therefore, both are valid when a firm's performance is calculated. In this study, subjective perceptions of the respondents were used to measure the dependent variable: firm performance. Based on previous literature, the term performance was divided to financial and operational performance. The respondents were asked to evaluate both the financial and operational (productivity, quality, etc.) performance of the company within the past three years on a scale of 1 (weak) to 4 (excellent).

3.1.4 Control variables. A total of three control variables were included: the industry and firm size (measured by two scales). A dummy variable was used for the industry, divided into manufacturing and service industries. Firm size was measured with a scale that asked the respondents to report the revenue of the firm in millions. Firm size was also measured by the number of employees in the firm.

3.2 Sample and data collection

A random sampling procedure was employed to draw a sample of 2,400 Finnish SMEs employing 11-249 persons and having revenue of 2-50 million euros. SMEs with fewer than ten employees were excluded from the sample. The web-based questionnaire targeted both the management and employee level of the SMEs. A total of 4,800 questionnaires were sent. Of these questionnaires, 4,050 reached the informants, while 750 questionnaires were returned to the researchers with return to sender (RTS) messages, indicating that the addresses were no longer valid. Three rounds of reminders were sent, each of them a week after the previous round. The final sample size was 311, reflecting a 7.68 percent response rate.

To check for non-response bias, an analysis of variance (ANOVA) test was performed. The informants were divided into four groups: the first informants, the first follow-ups, the second follow-ups, and the third follow-ups. The results of the ANOVA test revealed that there was no significant difference (at the 5 percent significance level) between the four groups. The results did not reveal any bias in the sample.

Variable name	No. of items	Measures	References
Innovation capability			
Participatory leadership culture	6	Encouragement	Wang and Ahmed (2004), Martensen *et al.* (2007), Kallio *et al.* (2012)
		Participation of managers	Tang (1999)
		Appreciation of employee knowledge and skills	Dobni (2008), Otala (2003), Martensen *et al.* (2007)
Ideation and organising structures	6	Ideation structures	Martensen *et al.* (2007)
		Feedback and rewards	Tang (1999), Otala (2003)
		Work organizing	Tang (1999), Otala (2003)
Work climate and wellbeing	5	Co-operation	Kallio *et al.* (2012)
		Support and trust	Otala (2003), Wang and Ahmed (2004)
		Mutual appreciation of all employees	Samson and Terziovski (1999), Dobni (2008)
Know-how development	3	Creating possibilities for education	Samson and Terziovski (1999), Calantone *et al.* (2002)
		Support for learning	Otala (2003)
Regeneration	3	Activity towards new methods of action	Hurt *et al.* (1977), Wang and Ahmed (2004), Martensen *et al.* (2007)
		Tolerance of mistakes	Dobni (2008)
External knowledge	3	Encouragement of acquiring knowledge outside an organization	Martensen *et al.* (2007), Dobni (2008)
		Developing actions and operations based on external knowledge	Guan and Ma (2003), Dobni (2008), Kallio *et al.* (2012)
Individual activity	3	Employee activity	Tang (1999), Kallio *et al.* (2012)
		Willingness to adopt new ways of action	Hurt *et al.* (1977), Dobni (2008)
Measurement			
	9	Existence of innovation measures	McAdam and Keogh (2004)
		Focus of measures on innovation	Tidd *et al.* (2005), Adams *et al* (2006)
		Use of innovation measures	Skarzynski and Gibson (2008)
Firm performance			
	2	Financial	Tangen (2004), Bueno *et al.* (2010)
		Operational	Tangen (2004), Bueno *et al.* (2010)

Table I.
Variable items and references

In terms of organizational size based on the number of employees, 72 percent of the responses came from firms with 49 employees or fewer, and around 28 percent were from firms with 50-249 employees. Based on revenue, around 45 percent of the responses were from firms with two to five million euro revenue, around 43 percent from firms with 5-20 million euro revenue, and around 11 percent from firms with 20-50 million euro revenue. Among the 311 responses, 71.4 percent were executives, and the rest were employees. About 47 percent of the responses came from the industrial sector and about 51 percent from the service sector.

4. Results

The validity of the variables was examined prior to hypothesis testing. Although the determinants of innovation capability are theoretically distinguishable constructs, factor analyses (FA) were conducted. The seven scales were subjected to principal component analysis to test the unidimensionality of the constructs and to eliminate unreliable items. One item was excluded, because it loaded alone among other items into one factor. The final results of the FA (Table II) for the determinants of innovation capability indicated that the measurement items had strong loadings on the constructs they were supposed to measure, thereby demonstrating unidimensionality. To test the reliability of the results, a Cronbach's α test was performed. The alpha values of six factors, as shown in Table II, were >0.60. In one factor (individual activity), the alpha value was <0.50, which indicates that the reliability of the factor can be questioned, and therefore the results concerning the factor should be handled circumspectly. Table III presents the intercorrelations of the variables. The variance inflation factors (VIFs) were computed

Table II.
Descriptive statistics and results of FA and reliability tests

Item	No of items	Mean	SD	Factor loadings	Cronbach's alpha
Participatory leadership culture	6	3.65	0.613	0.573-0.776	0.803
Ideation and organising structures	6	3.45	0.628	0.484-0.772	0.708
Work climate and wellbeing	5	3.94	0.597	0.704-0.807	0.786
Know-how development	3	3.76	0.783	0.778-0.843	0.738
Regeneration	3	3.80	0.784	0.799-0.869	0.766
External knowledge	3	3.96	0.733	0.731-0.797	0.625
Individual activity	3	3.59	0.612	0.570-0.764	0.486
Measurement	9	3.20	0.726	0.531-0.772	0.851
Firm performance	2	2.68	0.713	0.891-0.891	0.731

Table III.
Correlations of the variables

	1	2	3	4	5	6	7	8
Independent variables								
1 External knowledge								
2 Work climate and wellbeing	0.286***							
3 Ideation and organising structures	0.260***	0.556***						
4 Regeneration	0.390***	0.420***	0.419***					
5 Participatory leadership culture	0.273***	0.627***	0.559***	0.511***				
6 Individual activity	0.162***	0.386***	0.304***	0.379***	0.410***			
7 Know-how development	0.219***	0.483***	0.498***	0.394***	0.487***	0.308***		
Moderator variable								
8 Measurement	0.255***	0.398***	0.566***	0.379***	0.416***	0.278***	0.455***	
Dependent variable								
9 Firm performance	0.006	0.109****	0.225***	0.056	0.012	0.088	0.187**	0.122*

Notes: Significance *$0.01 < p \leqslant 0.05$; **$0.001 < p \leqslant 0.01$; *** $\leqslant 0.001$; ****$0.05 < p \leqslant 0.1$

to assess whether multicollinearity was a concern in the sample. All VIF values were well below the cut-off value of 10, indicating that multicollinearity did not cause problems.

Table IV presents the results of the moderation test. When the multiplicative items (determinants of innovation capability × firm performance) were entered in the model, the model was found to be significant (significance 0.000), with 15.9 percent of the variance in firm performance explained. The effect of exploitation of external knowledge is most significant ($\beta = 1.356$). When the multiplicative items were entered in regression one by one, none of the determinants alone was significant, but the determinants of innovation capability, together with measurement, had an effect on firm performance. The hypotheses propose a moderating effect of measurement on the relationship between innovation capability and firm performance. As shown above, the results support the *H6*. Consistent with the predictions, the link between innovation capability and firm performance is, indeed, strong in the presence of measurement.

5. Discussion

The findings support the conception that the positive impact of the exploitation of external knowledge on firm performance is moderated by performance measurement. Further, the results do not indicate the significant moderating effect of performance measurement related to other determinants of innovation capability. Beyond providing empirical support for the innovation capability-firm performance relationship, this study confirms the role of performance measurement as

	Firm performance	
Dependent variable	Beta	*t*
Revenue	0.247	3.542***
No of employees	−0.257	−3.552***
Industry	0.063	1.002
Determinants of innovation capability		
External knowledge (IN1)	−0.804	−2.147*
Work climate and wellbeing (IN2)	0.483	1.101
Ideation and organising structures (IN3)	0.222	0.637
Regeneration (IN4)	0.054	0.161
Participatory leadership culture (IN5)	−0.100	−0.247
Individual activity (IN6)	0.087	0.210
Know-how development (IN7)	0.303	1.108
Measurement (MEAS)	0.213	0.525
IN1 × MEAS	1.356	2.080*
IN2 × MEAS	−1.035	−1.052
IN3 × MEAS	0.108	0.157
IN4 × MEAS	−0.111	−0.190
IN5 × MEAS	−0.213	−0.261
IN6 × MEAS	−0.011	−0.014
IN7 × MEAS	−0.364	−0.718
F		2.725***
R		0.398
R^2		0.159
R^2 change		0.159***
F change		2.725***

Notes: Significance *$0.01 < p \leqslant 0.05$; **$0.001 < p \leqslant 0.01$; *** $\leqslant 0.001$; ****$0.05 < p \leqslant 0.1$

Table IV.
The results of moderator analyses

an important moderating link. This role can also be confirmed by taking the entire model under examination.

The model indicates an interesting result, in which exploitation of external knowledge has a negative and significant effect on firm performance, whereas the effect is significant and positive when it is moderated by performance measurement. Instead of focussing purely on the internal aspects of innovation capability, the external aspects seem to have a most significant positive impact on the firm performance when moderated by performance measurement. In earlier literature, the organization's ability to acquire outside knowledge and to collaborate externally is stated to be key to its innovative success (cf. Swink, 2006). Further, the strength of inter-firm relationships influences the extent of tacit knowledge transfer, and the tacit knowledge obtained from partner firms affects a firm's innovation capability (Cavusgil *et al.*, 2003). The earlier studies (cf. Lawson and Samson, 2001; Romijn and Albaladejo, 2002) have also indicated that interaction with suppliers, customers, industry associations, competitors, and the like can provide missing external inputs that the organization itself cannot provide. However, the current study indicates that, without the moderating effect of performance measurement, the impact of the exploitation of external knowledge for firm performance is negative. It can thus be stated that the challenges of exploiting external knowledge can be mastered through measurement. When the exploitation of external knowledge becomes more systematic and monitored, external knowledge may become more beneficial for the firm when achieving better performance. In turn, it seems that, when the performance measurement does not exist, the attempts to utilize external knowledge and best practices are ineffective without a clear focus and target or the ability to channel the resources to appropriate initiatives.

When focussing on the six other, more internal determinants of innovation capability, the significant moderating effect of performance measurement on firm performance does not exist. The nature of these determinants is more multiform in comparison, for example, to benchmarking the best practices, and the development results of these determinants usually occur gradually. The performance measurement initiatives, even the sophisticated ones, do not intrinsically guarantee a direct impact on firm performance. For example, individual activity and know-how development related to innovation capability and innovations require supporting tools to enable an idea generation pipeline (Skarzynski and Gibson, 2008) as well as proper organizational structures and systems (Lawson and Samson, 2001) before they can be realized as a firm asset. The results thus indicate that the performance measurement could be focussed on not only the determinants of innovation capability but also the processes that link the individual innovation capabilities to the organizational innovation capabilities and further to firm performance.

Bourne *et al.* (2003) conclude that performance measurement has an impact on the environment in which it operates. According to Pavlov and Bourne (2011), the impacts of performance measurement depend on the way such measurement is used. For example, Ukko *et al.* (2007, 2008) present many positive impacts of performance measurement on the different aspects of management, leadership, and quality of working life, which indirectly enhance the firm performance in the long run. This study has not taken into consideration what type of measurement moderates the relationship between innovation capability and firm performance. However, it can be assumed that the type of measurement may affect the impact of measurement in the relationship between innovation capability and firm performance. When measurement is used in its feed-forward function, it can affect the direction of the change in

organizational processes (Pavlov and Bourne, 2011). The results of this study show that measurement can facilitate this direction of change and assist in developing the exploitation of external knowledge-firm performance relationship.

A relationship exists between innovation capability and firm performance, but the connection is still challenging. Although the current study does not present the way the measurement is used, it confirms that the SMEs have succeeded in such measurement as regards the exploitation of external knowledge. Measurement can have positive effects on this relationship; thus, measurement can be used as a tool for developing and monitoring the exploitation of the external knowledge-firm performance relationship.

6. Conclusions

This paper has presented the results of a study investigating the moderating effects of performance measurement in the relationship between the determinants of innovation capability and organizational performance. The results show that measurement partly moderates the relationship. Firms that measure the determinants of innovation capability, especially through active exploitation of external knowledge, are more likely to engage in a higher level of innovation capability, which in turn has a positive impact on their performance. Performance measurement can thus be used as a tool for improving SME performance through innovation capability.

There are some limitations to the study that should be acknowledged. The data used in the study were collected with subjective measures based on the perceptions of companies' managers and employees. Although perceptual data are extensively used in business studies, there is a possibility that the subjectivity of the measures has biased the results of the study. In addition, a majority of the responses came from managers. Thus, managers' opinions are emphasized in the results. Finally, the study is based on data from a single country. The specific country characteristics should be taken into account when the results are applied to practice or further studies. The sample covered a large portion of Finnish SMEs employing 11-249 people and having revenue of 2-50 million euros. The results can thus be considered to be generalized to SMEs at least in Finland. For further research, in-depth studies are needed to clarify how the SMEs use the performance measurement to manage performance through external knowledge. Regarding the other determinants of innovation capability, it would be interesting to discover whether the measurement is focussed more on the single determinants or on the process that transfers the innovation capability to firm performance. The presumption for further research can be that measurement can have positive effects when it has been conducted in a way that concurrently takes into account the determinants, process, and performance aspects of innovation capability. In this way, measurement could be considered a useful link for SMEs in their attempts to manage such a multifaceted construct as innovation capability, in order to achieve higher performance. Further research could also study the type of measurement and measures that are most effective when the relationship between innovation capability and performance are facilitated through measurement.

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A CONCEPTUAL FRAMEWORK FOR THE MEASUREMENT OF INNOVATION CAPABILITY AND ITS EFFECTS

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A conceptual framework for the measurement of innovation capability and its effects

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Abstract

Purpose – The purpose of this paper is to clarify the concept of innovation capability and to show how the linkage between innovation capability and performance measurement can be formed.

Design/methodology/approach – The study is based on current literature of innovation capability and performance measurement and matching these two to find out how the measurement of innovation capability should be organized.

Findings – The paper describes the concept of innovation capability and presents a performance measurement framework for the measurement of innovation capability and its effects. As a result, a conceptual framework with five perspectives for measuring the relationship between innovation capability and business performance is presented. Also, the link between innovation capability and an organization's business performance is disclosed.

Originality/value – The paper shows a way forward of how to define measures of business performance in such a way that they are led from the development of innovation capability.

Keywords Organizational performance, Performance measures, Organizational innovation, Innovation capability, Performance measurement framework

Paper type Conceptual paper

1. Introduction

To become innovative, an organization has to develop its innovation capability. Managing creativity and capabilities, like innovation capability, is one of the basic elements of an innovative organization. Nowadays, when organizations operate in very challenging environments, developing their innovation capability is vital. Organizations devoting themselves to the development of their innovation capability have better prospects to succeed in the future. According to Alasoini *et al.* (2007), an organization's competitiveness will be even more dependent on its ability to produce innovations in the future. Thus, it can be assumed that an organization's performance is more and more dependent on its innovation capability (Alasoini *et al.*, 2007). To be conscious about the current state and development of innovation capability, organizations need to measure it. However, the measurement of innovation capability is challenging, because it is intangible by nature (Albaladejo and Romijn, 2000). Measuring is important for the development of innovation capability, and thus important for the future success of the organization. The current literature does not provide comprehensive frameworks for the measurement of innovation capability and its effects. Previous models (for example the strategy map presented by Kaplan and Norton (2004)) either consider the innovation process as a linear and separately identifiable construct or are not purely targeted to innovation capability

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measurement (Epstein, 2007). In this paper, innovation capability is seen in a more holistic way, and thus the study contributes to current understanding by taking the research issue one step further.

This study presents a performance measurement framework for the measurement of innovation capability and its effects. It is also clarified how measures of innovation capability should be linked to measures of the organization's overall performance. The conceptual framework of innovation capability measurement is based on a review of the innovation capability and performance measurement literature. Before the framework is presented, the concept of innovation capability is defined, based on previous definitions in the literature. The framework has been formed by studying the existing literature on performance measurement frameworks and current assessment models related to innovation capability or certain components of it.

2. Performance measurement

2.1 Designing performance measurement

Neely *et al.* (2005) define performance measurement as "the process of quantifying the efficiency and effectiveness of action". Performance measurement can also be defined quantifying the input, output or level of activity of an event or process (Radnor and Barnes, 2007). Performance management is action based on performance measurement, which results in improvements in behavior, motivation and processes. Further, Radnor and Barnes (2007) consider that performance measurement is about efficiency, productivity and utilization, whereas performance management builds on performance measurement and is concerned with effectiveness and a broader, more holistic, even qualitative view of operations and the organization.

Performance measurement can be divided into four phases: design, implementation, use, and maintenance of a performance measurement system (Neely *et al.*, 2000). There are many different process models for the design of performance measurement systems in current literature. Kaplan and Norton (1996) have presented a four phase process of how to construct a balanced scorecard for an organization. Laitinen's (2003) process model includes 14 phases and is designed for the design and implementation of a dynamic performance measurement system. The methods used for the design and the number of phases vary, but the processes are very similar: first, the use is clarified and measurement objectives defined, and then measures are defined for the objectives.

The measures can be divided into direct and indirect, objective and subjective, and financial and non-financial ones. Indirect measures are used, when something cannot be measured directly. Objective measures are based on quantitative information. Subjective measures are usually based on people's opinions (Lönnqvist *et al.*, 2006). Performance measurement is traditionally concentrated on financial measures (Yliherva, 2004; Bourne *et al.*, 2005). Performance measurement is today seen as a comprehensive process. It means that all things happening in the organization are considered to have an impact on the performance of the organization. These things include leadership and management, employees' task motivation, the quality of operations, and the ability of products to fulfill customers' needs (Franco and Bourne, 2003; Laitinen, 2003; Bourne *et al.*, 2005; Ukko *et al.*, 2008). Also the purposes of using performance measurement vary. Performance measurement can be used, for example, for motivating the employees, communicating information, and leading actions (Franco and Bourne, 2003; Lönnqvist *et al.*, 2006; Türk, 2008).

2.2 Performance measurement frameworks

Comprehensive performance measurement frameworks sum all essential information to a concise set of measures based on one framework (Laitinen, 2003). No single measure can provide a clear target or focus the attention on the right business areas (Kaplan and Norton, 2005). According to Neely *et al.* (2000), performance measurement frameworks are useful, but they only provide guidelines for how measures should be identified, introduced and used for management purposes. The strength of a performance measurement framework lies in the way it pays attention to different measures of business performance – financial and non-financial, internal and external (Neely *et al.*, 2000; Franco and Bourne, 2003).

Laitinen (2003) suggests the following requirements for performance measurement frameworks:

- All essential perspectives have to be encompassed.
- The measures have to compose a logical collection.
- The framework has to be useful for decision-making.
- The framework has to make performance improvement possible.
- Short-term measures have to predict long-term measures.

The literature provides several frameworks for performance measurement. These include for example the balanced scorecard, performance prism and performance pyramid. The navigator and intangible asset monitor are especially designed for the measurement of intangible assets. For example, the performance prism includes five perspectives: stakeholder satisfaction, strategies, processes, capabilities, and stakeholder contribution. The performance prism helps leaders to concentrate on the key issues they want to address when managing the organization (Neely *et al.*, 2001a). The balanced scorecard includes four perspectives: financial, customer, internal processes, and innovation and learning. The balanced scorecard is based on the organization's vision and strategy. It forces the organization to focus on measures that are the most important, aiming to avoid overload of information (Kaplan and Norton, 2005). The navigator has five perspectives: financial, customer, process, renewal and development, and human capital. One aim is to uncover and visualize the organizations intangible assets. The navigator contains both financial and non-financial measures, which estimate the organization's market value (Bontis, 2001; Lönnqvist *et al.*, 2006). The intangible asset monitor is based on three classes of intangible assets: external structure (stakeholder relations, etc.), internal structure (management, attitudes, etc.), and individual competence (education, experience, etc.). Each class of intangible assets is measured via three indicators: growth and renewal (i.e. change), efficiency and stability (Bontis, 2001).

3. Nature of innovation capability

Innovation can only occur if a firm has the capability to innovate (Laforet, 2011). Innovation capability is composed of the main processes within the firm (Lawson and Samson, 2001). It cannot be separated from other practices. According to Neely *et al.* (2001b), an organization's innovation capability can be thought of as the potential to generate innovative outputs. Yliherva (2004) defines innovation capability as follows: innovation capability consists of an organization's intangible property and the ability to exploit this property in such way that the organization is able to produce new

innovations perpetually. Lawson and Samson (2001) define innovation capability as "the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders". Rangone (1999) defines innovation capability as an organization's ability to develop new products and processes, and to achieve superior technological and management performance. According to Assink (2006), disruptive innovation capability is a driving energy to generate and explore radical new ideas and concepts, to develop them into marketable and effective innovations, leveraging internal and external resources and competencies. Branzei and Vertinsky (2006) define product innovation capability as the ability to acquire and assimilate external knowledge, transform it into novel, unique competencies and ideas, and then harvest these ideas by first generating and then effectively commercializing new or improved products.

In light of the earlier literature, innovation capability can be defined as follows. In this study, innovation capability is defined to consist of the elements influencing an organization's capability to manage innovation. The concept of innovation capability includes three elements:

(1) Innovation potential consists of factors that affect the present state of innovation capability. The factors reflect the potential that organizations have to produce innovations.

(2) Innovation processes are systems and activities that assist organizations to utilize their innovation potential and therefore enable innovations. They are the way systems and activities are carried out.

(3) The results of innovation activities are, e.g. product/service innovations, and process innovations.

A majority of the previous definitions determine innovation capability as a potential. This extended definition is presented to show the various elements of innovation capability that can have an effect on performance. Innovation capability can also appear as a capability that has already been realized. Thus, limiting the measurement of innovation capability only to the potential gives a very limited view of the effects. All three elements of innovation capability can contribute to the different areas of business performance, alone or through other elements.

3.1 Innovation potential

A body of literature has identified the potential shared by innovative organizations (Lawson and Samson, 2001; Skarzynski and Gibson, 2008; Tura *et al.*, 2008; Paalanen *et al.*, 2009; Saunila and Ukko, 2012). For example, Skarzynski and Gibson (2008) divide innovation capability into four categories: leadership and organization, people and skills, process and tools, and culture and values. Ståhle *et al.* (2004) list four elements which can become either promoters or obstacles of innovation: people and the atmosphere, the physical environment, mental models, and decision-making and power structures. Another definition presented by Paalanen *et al.* (2009) sees innovation capability through a practice-based innovation activities approach. According to their view, the subcategories of innovation capability are absorptive capacity and external knowledge, organizational structures and culture, leadership and communication, and individual creativity and innovativeness. Similarly, Lawson and Samson (2001) see that the subcategories of innovation capability are vision and strategy, harnessing

the competence base, organizational intelligence, creativity and idea management, organizational structure and systems, culture and climate, and management of technology. Tura *et al.* (2008) define innovative capability via three subcategories: openness/creativity, knowledge/expertise, and operationalization capability. The first subcategory comprises the capabilities needed to exceed the existing solutions and search for new possibilities. The second subcategory covers the capabilities to acquire the knowledge needed to build innovation. The third subcategory describes the capabilities to find and introduce applications, so that the organization exploits the achievable knowledge base.

The concept of innovation capability can be considered more widely than presented above, however. In this study, innovation potential refers to the factors that make it possible for the firm to create innovations. The term innovation potential is used to represent the subcategories of innovation capability. According to earlier literature, factors that form the innovation potential of an organization can be divided into five categories:

(1) leadership and decision-making processes;

(2) organizational structures and communication;

(3) collaboration and external links;

(4) organizational culture and climate; and

(5) individual creativity and know-how.

3.2 Innovation processes

According to Skarzynski and Gibson (2008), besides innovation inputs and outputs, it is important to evaluate the activities related to innovation processes. In this study, the innovation processes of the firm help the innovation potential to become a firm asset. For the innovation processes to be successful, the exploitation of innovation potential has to be successful. Therefore, the subcategories of innovation capability can be either enablers or obstacles of innovation processes. There exist many views in the current literature on how to define innovation process-related activities.

Koen *et al.* (2001) divide the innovation process into three main phases: front end, new product development and commercialization. Herstatt *et al.* (2004) suggest five phases: idea generation and assessment, concept development, development, prototype development and testing, and production, market introduction and diffusion. The first two phases form the front end phase. The innovation process-related activities discussed in this paper are placed in the front end phase. Koen *et al.* (2001) divide the front end into five elements: opportunity identification, opportunity analysis, idea genesis, idea selection, and concept and technology development (Reid and de Brentani, 2004). They are elements of the innovation process activities rather than phases, because the front end is not a structured process. The elements are performed concurrently and ideas circulate and are iterated between the phases. Koen *et al.* (2001) also define factors that drive the front end elements. These factors, which include leadership and the culture of the organization, overlap with the innovation potential categories presented above.

3.3 Results of innovation activities

Successful innovation process activities are expected to have some outcomes, innovations. Ståhle *et al.* (2004) define innovation as an improvement, which can be

used as an advantage in competition in the market. Amabile *et al.* (1996) explain innovation as successful implementation of creative ideas within an organization. Innovation can be classified as products and services, or as changes in the way the organization creates and delivers products and services (Assink, 2006). In this study, innovation is defined as a new issue that creates value to the firm or its stakeholders. The basis of innovation does not have to be a completely new idea. It has to be new for the organization applying it. The value of innovation does not have to be economic value. It can be an improvement of the working climate or way of life (Ståhle *et al.*, 2004). Finally, innovations can be divided into several categories: technical and organizational innovations, product and process innovations, and radical and incremental innovations (Wan *et al.*, 2005; Kirner *et al.*, 2009).

4. Measurement of innovation capability

4.1 Current measures

Appropriate measures of performance can contribute to a significantly better understanding of innovation. The most appropriate are those measures that enable focusing the innovation (Birchall *et al.*, 2011). There are some common characteristics in the current innovation capability measures. They are focused on industrial and technology innovations. Service innovations have no proper measures (Tura *et al.*, 2008). Current measures do not recognize, either, that organizations have different sizes and they operate in very different business areas (Carayannis and Provance, 2008). The best ones of the current measures are the ones which pay attention to both inputs and outputs of innovation (Albaladejo and Romijn, 2000). Few studies have proposed measures for innovation capability measurement. Cavusgil *et al.* (2003) have measured innovation capability by five items: the frequency of innovations, order of market entry, simultaneous entry in multiple markets, and the ability to penetrate new markets to tap the various facets of innovation capability. Albaladejo and Romijn (2000) limit innovation capability measurement to product innovations. They use three measures. The first one measures whether or not the organization has had at least one product innovation in a three-year period. The second one is the number of patents. The third one is an index which shows the significance of the organization's innovative outputs in a three-year period. The current measures of innovation capability can be divided roughly into two categories: input measures and output measures (Albaladejo and Romijn, 2000).

Input measures evaluate how the innovation activities have been arranged and how resources are allocated to them. Input measures include the funds used in R&D activities and education (Tura *et al.*, 2008). Input measurement is problematic, because it tells how much is devoted, not if anything has been accomplished. Input measures also underestimate smaller innovation activities. Smaller organizations do not have opportunities to invest in R&D. That is why input measures do not reflect the actual innovation capability (Albaladejo and Romijn, 2000). Output measures evaluate the effects of innovation capability. It is hard to express all kinds of innovations quantitatively, and output measures usually measure the results of successful innovations (Tura *et al.*, 2008). Output measures mainly include the organization's patents and licenses. The problem of output measures is that they are only suitable for certain types of innovations and organizations. They are not suitable for small or service organizations (Albaladejo and Romijn, 2000). Output measures do not measure the economic value of all kinds of innovations, either (Tura *et al.*, 2008). Intangible measures are much

undeveloped compared to financial measures. Numerical value is not always the best or the most important benefit attained through measurement. It is more important to notice the change in the measurement results (Yliherva, 2004). A comparison and summary of the current measures are presented in Table I.

4.2 Current measurement models

In light of earlier literature, it can be noticed that innovation capability has traditionally been measured via questionnaires or other subjective assessment models. There are various models for the measurement of innovation capability or factors closely related to innovation capability (Prajogo and Ahmed, 2006; Panayides, 2006; Bass and Riggio, 2006; Dobni, 2008; Kivipõld and Vadi, 2010). The measurement of innovation capability from the perspective of performance management has been less studied. The current literature lacks models for the measurement on innovation capability and its effects in organizations. As presented above, single measures have been suggested, but comprehensive measurement frameworks have not been developed. Therefore, the performance management perspective is not well embodied in the current literature.

The innovation perspective is in a small part in some current well known performance measurement models. For example, Kaplan and Norton (2004) have presented a strategy map which represents how an organization can create value. In this approach, the innovation process is considered one of the important internal processes. There are only a few models that are especially targeted to the measurement of innovation. One of the few models is presented by Capaldo *et al.* (2003), who propose an innovation capability evaluating method with four resource sets: entrepreneurial resources, human resources, resources arising from external linkages, and economic resources. Each set contains several measures to evaluate both the degree of market innovation capability and the degree of technological innovation capability. Also several models for the measurement of innovation have been developed. These models include some elements of innovation capability presented above. Muller *et al.* (2005) have presented a matrix for the measurement of innovation. The matrix has been divided into three categories: resources, capabilities and leadership. These categories are measured in three perspectives: inputs, processes and outputs. Adams *et al.* (2006) have designed

			Focus		
Type of measure	Description	Subjective/ objective	Industrial/ service firms	Large/small innovations	Limitations
Input	Evaluate how the innovation activities have been arranged	Objective	Industrial (service)	Large	Does not show what has been accomplished with the investments Concentrates on larger innovations
Output/ outcome	Evaluate the effects of successful innovations	Objective	Industrial	Large	Not suitable for small or service organizations Does not usually take into account the economic value of innovations

Table I.
Comparison and analysis of the measures and measurement of innovation capability

a framework for the measurement of innovation management. The framework has been divided into seven categories: inputs, knowledge management, innovation strategy, organization and culture, portfolio management, project management, and commercialization. In total there are 19 measurement areas in the framework. Epstein (2007) has constructed an innovation contribution model, which includes input, process, output and outcome measures. It concentrates on the antecedents and consequences of investment in innovation. Carayannis and Provance (2008) have suggested a 3P-framework for the measurement of innovation processes. The framework contains three categories, which are posture, propensity and performance. These categories include measures on innovation inputs, process capabilities and performance. The measures are used to form an index, which shows the present state of the innovation processes in the organization.

5. Linking innovation capability and performance

According to Calantone *et al.* (2002) innovativeness is the most important determinant of an organization's performance. Tidd (2001) divides measures that are used to prove the relationship between innovation and business performance, into two categories. The first group concerns accounting and financial performance. These measures include profitability, return on investment and share price. The second group concerns market performance, for example the share or growth (Tidd, 2001). Many earlier studies have confirmed the positive relationship between innovativeness and an organization's business performance (Lawless and Anderson, 1996; Subramanian and Nilakanta, 1996; Gopalakrishnan, 2000; Klomp and Van Leeuwen, 2001; Cho and Pucik, 2005; Chapman, 2006; Armbruster *et al.*, 2008).

According to Chapman (2006), innovations have a strong effect on financial success. The study found a strong link between collaboration and financial performance – organizations using external sources achieve higher revenue growth than others. Klomp and Van Leeuwen (2001) discovered that innovations and innovativeness have an impact on sales performance and productivity (measured sales/employee). Subramanian and Nilakanta (1996) found that different kind of innovations have an impact on different fields of performance. Organizational innovations improve coordination and co-operation in the organization, and they have been indicated also as better results in efficiency measures. Technical innovations improve the organization's competitiveness, and they have been shown to have a positive impact on the results of effectiveness measures (Subramanian and Nilakanta, 1996). Armbruster *et al.* (2008) have shown that organizational innovations act as prerequisites and facilitators of an efficient use of technical product and process innovations, and therefore they are sources of competitive advantage. Organizational innovations themselves have impact on business performance with regard to productivity, lead-times, quality and flexibility (Armbruster *et al.*, 2008). Cho and Pucik (2005) have studied how an organization's innovativeness and quality affects performance. They discovered that innovativeness is a driver of growth, quality is a driver of profit, and both are drivers of market value. Innovativeness also affects profitability indirectly through quality (Cho and Pucik, 2005). According to Gopalakrishnan (2000), the speed and innovation magnitude are linked to the results of different measures of performance. Innovation speed has a strong impact on financial performance, measured by the average return on assets. However, innovation speed is not associated with executives' perceptions

of overall performance. Innovation magnitude is associated with executives' positive perceptions of overall performance even though it does not have a significant impact on financial performance (Gopalakrishnan, 2000). The study of Palaima and Skaržauskienė (2010) revealed that systems thinking is associated with higher leadership performance. These results indicate that the relationship between innovations and performance is still challenging, and the studies have focused on certain elements of innovations and performance. Although there is a variety of studies concerning innovations and performance, there is a lack of studies concerning the measurement of innovation capability. Hence, there is still a need to develop more comprehensive measurement frameworks for the measurement of the effects innovation capability.

6. A framework for measuring the effects of innovation capability

6.1 Research method

The aim was to develop a general procedure to clarify, how the different aspects of performance can be linked to the measurement of the effects of innovation capability in organizations. The measurement framework was developed by examining and matching the existing literature of innovation capability and performance measurement.

The first research phase was forming an understanding of the concept of innovation capability to define what exactly is being measured. According to Olkkonen (1994), a concept is an abstract, general and compact definition of a phenomenon. Precisely defined concepts are essential for scientific research, especially when the measurement of a phenomenon is carried out (Olkkonen, 1994). Previous literature was searched earlier used approaches and to form a definition of the concept of innovation capability and related concepts. The second phase was examining current measurement frameworks, and further how the measurement of innovation capability has been noticed in the current literature of performance measurement. The phase was conducted by analyzing earlier innovation measurement literature and forming an understanding of which of the previously constructed performance measurement frameworks would be the most suitable to be adapted to the measurement of innovation capability and its effects.

In the third phase, a conceptual framework for the measurement of innovation capability was formed on the basis of the previous phases. Jabareen (2009) has defined a conceptual framework as a network of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena. The concepts that constitute a conceptual framework support one another, articulate their respective phenomena, and establish a framework-specific philosophy. The features of conceptual frameworks can be defined as follows (Levering, 2002; Jabareen, 2009):

- A conceptual framework is a construct in which each concept plays an integral role.
- A conceptual framework provides an interpretative approach to social reality.
- Conceptual frameworks provide understanding.
- A conceptual framework provides "soft interpretation of intentions".
- Conceptual frameworks do not enable predicting an outcome.
- Conceptual frameworks can be developed and constructed through a process of qualitative analysis.
- The sources of data consist of many discipline-oriented theories that become empirical data of conceptual framework analysis.

In this phase, the process and basis for the measurement of innovation capability are presented and the measurement process connected to the balanced scorecard. The balanced scorecard was chosen because it is the most common and frequently used performance measurement framework. Organizations using the balanced scorecard can use the framework presented in this study to connect the innovation capability and its effect measures to the balanced scorecard measures already exploited in the organization. It also represents all the significant perspectives of performance and therefore gives a balanced view of the organization's performance. The second reason that justifies connecting innovation capability measurement with the current performance measurement framework is based on the study of Kujansivu (2008). Kujansivu suggests that the balanced performance measurement system may be appropriate to support intellectual capital management. It can be assumed that the same principles can be applied to the measurement of innovation capability, which is mainly intangible. Third, Epstein (2007) has used the balanced scorecard for an innovation contribution model, suggesting that it is useful as a performance evaluation system and it can also be useful when used to evaluate an organization's innovation efforts in particular. Balanced scorecard focuses on better understanding on the causal relationships and linkages within the organization and the levers that can be pulled to improve corporate performance (Epstein, 2007). Thus, the balanced scorecard can be useful also when measuring the organization's capability to produce innovations and its effects.

6.2 Principles for the measurement of innovation capability

When developing innovation capability, innovation outputs are expected (Lawson and Samson, 2001). In this situation innovation outputs are the results of practice-based innovation activities. It is also expected that continuous successful results of innovation activities will make the organization more innovative. Many studies have indicated a positive relationship between an organization's innovativeness and overall performance (see the previous section). The innovation capability measurement framework is based on this assumption.

As presented above, innovation capability cannot usually be measured directly. The measures have to be designed so that they measure things closely related to innovation capability. Hence, when measuring innovation capability, three elements have to be considered: potential, processes and results. These elements can be measured by objective or subjective measures or both.

The measurement of innovation capability and its effects is based on four components. The basic principles of the measurement of innovation capability are shown in Figure 1. The factors of innovation potential can be either promoters or obstacles of innovation. Exploitation of innovation potential is needed for successful

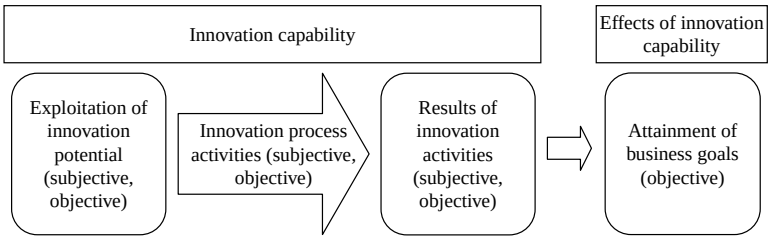

Figure 1.
Basis for the measurement of innovation capability and its effects

innovation process-related activities. When the innovation activities are successful, their results are also better. Successful innovation activities have a positive effect on the organization's business. These four phases have to be considered when designing the framework for the measurement of innovation capability and its effects.

6.3 The measurement framework

Previous models and frameworks dealing with innovation performance measurement have concentrated on for example resources dedicated to innovation (Capaldo *et al.*, 2003; Muller *et al.*, 2005), innovation processes (Carayannis and Provance, 2008), innovation leadership and management (Muller *et al.*, 2005; Adams *et al.*, 2006), and capabilities (Muller *et al.*, 2005; Adams *et al.*, 2006). However, the capabilities view is a very small part of the models. There have been only a few attempts to create a framework for the measurement of innovation capability especially. Comprehensive innovation capability measurement frameworks have not been presented in the previous literature.

The result of the study is a conceptual framework for the measurement of the effects of innovation capability in organizations. The framework is based on the balanced scorecard. When the framework was designed, special attention was paid to the concept of innovation capability. Thus, the four balanced scorecard perspectives were renamed to match the principles of the measurement of the effects of innovation capability. For example, innovation capability associates better with the wider focus on personnel than just the perspective of learning and growth. Another purpose was to achieve a balanced view of the development of innovation capability through innovation performance measurement. The innovation performance perspective was used to capture the objectives and measures related to the three innovation capability elements. One basis for the framework was making it possible to consider the relationship between innovation capability and business performance in assisting the measurement of innovation capability. Thus, the main question is: how to define the cause-effect relationship between innovation capability measures and business performance measures? The constructed framework provides guidelines for which perspectives should be catered when measuring the effects of innovation capability. Five perspectives were chosen to the framework: financial, customer, processes, personnel, and innovation performance. The innovation performance perspective includes measures related to innovation capability, both potential, concrete activities and their results. The perspectives of financial, customer, internal processes and personnel performance measure the effects of innovation capability in the organization's business goals. These perspectives are shown in Figure 2. The framework represents the principles for the measurement of innovation capability shown in Figure 1 in the following way: the innovation performance perspective is used for measuring the three elements of innovation capability, and the effects are measured via the rest four perspectives (customers, processes, personnel and financial).

The innovation performance perspective may include various kinds of measures. The objectives and their measures are case-specific, and goals are set considering the organization's starting points and characteristics. However, the main point is to measure things related to innovation capability or some of its elements (namely potential, processes and results). Hence, the innovation performance perspective can include measures related to the elements of innovation capability (innovation potential, innovation processes and results of innovation activities). These include for example:

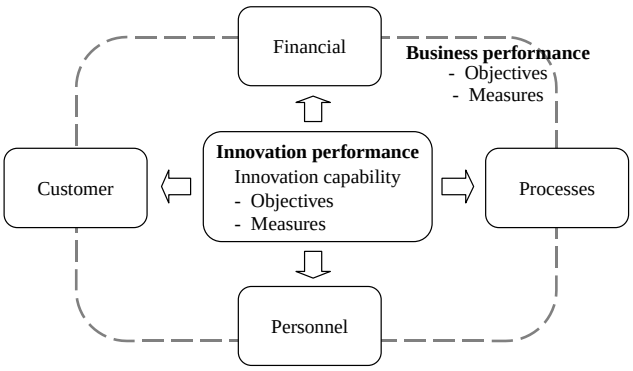

Figure 2.
Framework for the measurement of innovation capability and its effects

- creativity;
- motivation;
- leadership;
- communication channels;
- idea creation and assessment;
- new products or services; and
- new procedures or ways of action.

The basis of the innovation capability framework is shown in Figure 3. Innovation performance consists of the three elements of innovation capability, namely potential, process and results. The measures of the innovation performance perspective concentrate on evaluating the elements of innovation capability. These measures are linked to the business performance measures divided into four perspectives, namely financial, customer, processes and personnel. As a summary, one factor is chosen from one of the elements of innovation capability and the measure to the factor is defined. Then the measure is linked to the business performance measure. If the state of the innovation capability measure changes, changes are also expected in the business performance measure. This cause-effect relationship can be either direct or indirect, meaning that improvement in the innovation capability measure can show directly in the personnel perspective measure, or indirectly through processes perspective measure.

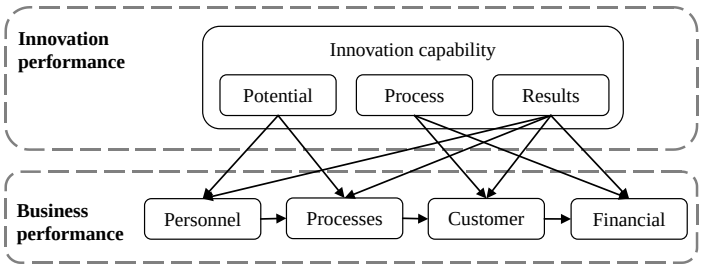

Figure 3.
Different stages of measurement and cause-effect linkages

The effects of the exploitation of innovation capability are discussed next. The innovation capability elements are modified into objectives of innovation performance, as described in the previous section. What can the exploitation of innovation capability mean in each perspective of business performance? The basic idea of the framework is that the objectives of the innovation performance perspective are linked into business objectives, because it is not enough to get the output of innovation, but also the outcome of innovation. In this case, concrete objectives or measures are not provided, but directions and guidelines are presented. The following four questions and their answers reflect how the link between innovation capability and the four business performance perspectives can be formed. It is also discussed how the development of innovation capability can occur in business performance measures. Thus, the presented measures are examples of the measures that can be utilized in innovation capability effect measurement. The measures cannot be the same in every case, because innovation capability also varies between different types of organizations.

When the framework is utilized, the following issues should be acknowledged:

- defining objects of innovation capability;
- defining measures to the objects of innovation capability;
- defining the linkage of what improvements of business performance are expected when developing the innovation capability objects;
- defining the objects of business performance perspectives;
- defining measures of business performance; and
- defining cause-effect relationships of business performance measures.

1. How does the development of innovation capability affect the behavior of our "customers?" When developing innovation capability, the benefits to customers should be taken into consideration. Customer satisfaction tells how well the organization is doing. Things that affect customer satisfaction include time, quality, service and cost. However, it is not enough to have satisfied customers, the customers should also be profitable. Measures related to markets reveal how well an organization is doing in a desired market. Besides trying to get new customers, it is important to retain the existing customers. Hence, the customer perspective can include measures related to:

- customer profitability;
- customer retention;
- customer satisfaction; and
- market share.

Next, some examples of the linkage between innovation performance and customer perspective are given. Improvements in production processes may increase customer profitability, if the products are made with lower costs than earlier. Thus, improvements in the production process can be measured via lead-time, which is a measure of innovation performance, if the improvements in the production process are made as a consequence of a new innovative process part. Changes in this measure can in turn lead to better customer profitability. New ways of communication with customers can be a measure of creativity in the innovation performance perspective. It can affect customer retention. The effects of the development of innovation capability on customer

satisfaction can be indicated by measuring whether the new service process has improved the provided service. New innovative service processes, measured via capture percentage as an innovation performance measure, can make the customers more satisfied with the service. A new, improved version of a product or service may show as a bigger market share. Thus, number of new products or services can be linked to the measure of market share.

2. How does the development of innovation capability affect the internal "processes" within an organization? The purpose for innovation capability development may be improving the operating efficiency continually. After all, processes, decisions and actions occurring throughout an organization have an effect on the fields from other performance perspectives. Also the flow of information through the organization can be examined. On the other hand, it is not enough to operate effectively, but also with high quality. Hence, the process perspective can include measures related to:

- quality of products and services;
- flexibility of decision-making;
- reliability of deliveries; and
- effectiveness of problem-solving.

The linkage between innovation performance and the process perspective may be shown as follows. Improvements of production process can increase the quality of products. The effects of innovation capability development on the quality of products can be measured via the proportion of secondary production. In addition, if the new production process leads to fewer errors (errors as a measure of innovation performance), this can come up as fewer reclamations (measure of product quality). If communication channels are innovated to be easier to use and are clarified to all employees, it will make the decision-making more flexible when information flows more effectively through the organization. In this case, the measure of innovation performance can be a questionnaire to the employees asking whether the communication channels are easy to use. This measure can be linked to the measure of business performance indicating whether the managers consider they have enough information for the decision-making. The reliability of deliveries may sharpen if optimization of stockpile is advanced by new innovations. To give an example, the reliability of deliveries could be measured by lead-time from order to delivery after and before the optimization of stockpile (innovation performance measure). New innovative use of the reporting system for history information of defaults can increase the effectiveness of problem-solving. The number of people using the reporting system to evaluating the organization's innovation activities can be a measure of motivation in the innovation performance perspective and it can be linked to the process perspective measure (the availability of information for problems occurred).

3. How can we create value to our "personnel" via the development of innovation capability? The employees are the most important asset of an organization. An organization's ability to innovate, improve and learn is dependent on its employees, which is directly associated to the organization's value and competitiveness. It is important to create value to the employees, in order to increase the value of the organization. Investments made to train and reinforce the employees will return to the organization in the long run. Hence, the personnel perspective can include measures related to:

- employee satisfaction;
- employee retention; and
- employee skills.

Some examples of the linkage between innovation performance and the personnel perspective are presented next. The new reward system should have an effect on employee satisfaction. The relationship between innovation capability development and employee satisfaction can be measured for example by clarifying the effects of a new reward system for employee satisfaction and retention. Thus, the amount of rewards as an innovation performance measure can be linked to an employee satisfaction survey, which can be further linked to the other business performance perspectives. This example is shown in Figure 4. Also new training programs can be developed through innovation capability development to increase the skills and satisfaction of the employees. The number of education events can be linked to the medium number of tasks which each employee is capable of doing. Similarly, a new leadership style can be a key for motivating people, and when the employees are motivated to do their tasks, it may increase employee retention. In this case, the number of leaders that have applied participative methods in their leading can be linked to the number of employees that have resigned.

4. Have the outcomes of innovation capability development been "financially" successful? The objectives of the other three perspectives are to assist financial objectives to come true. However, it is not easy to explicate the linkage between the financial perspective and different operations related to other perspectives. The main goal of any organization is to operate profitably. The development of innovation capability can be shown as improvements in profitability, growth and shareholder value. Hence, the financial perspective can include measures related to:

- added value;
- profitability; and
- growth.

The linkage between innovation performance and the financial perspective can be shown as follows. Outlining a more powerful brand should add value to an organization.

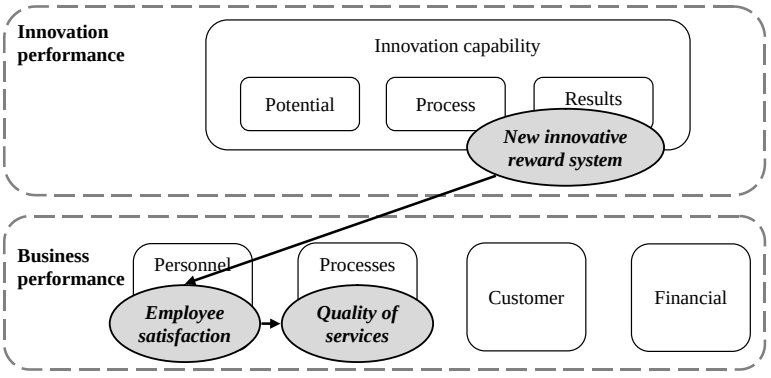

Figure 4.
Example of the cause-effect linkages of the framework

Innovation performance can be measured via the number of working hours used for brand creation. The added value received through brand creation can be measured by asking how big a portion of potential customers recognize the organization's name. New ways of using material in the production processes may affect the profitability of an organization, if work can be done more effectively with lower costs. The number of new innovative materials can be a measure of innovation performance which is linked to the profit margin of the product used as a financial perspective measure. The expansion of product variety may help the organization to penetrate to new markets and grow. The effects of innovation capability on the organization's growth can be measured via assessing whether the volume of the orders (measure of financial perspective) of new innovative products have increased (number of new innovative products as an innovation performance measure).

As a summary, it can be stated that the above descriptions, linked both to innovation performance and four business performance perspectives, are examples of how innovation capability and its effects to an organization's business performance can be justified and measured. The framework does not propose any specific objectives or measures, because they depend on what part of innovation capability the organization is developing, and further, on the focus of the business performance affected by the innovation capability. Therefore, the objectives and measures are case-specific, whereas the measurement perspectives are the same in every case.

7. Discussion and conclusions

This paper contributes to the current literature by presenting a conceptual framework designed especially for the measurement of innovation capability and its effects. The issue is essential, because an organization has to improve its innovation capability to become innovative, and further to manage in business. So far, the problem has been the measurement of the effects of innovation capability.

The strategy map presented by Kaplan and Norton (2004) considers the innovation process as linear and separately identifiable construct. However, in the framework presented in this paper, innovation capability is seen in a more holistic way. Lawson and Samson (2001) point out that innovation capability is associated with the main processes within the firm, and it cannot be separated from other practices. All three elements of innovation capability can have effects on business performance related to the personnel, customers, processes and finances. The elements do not follow each other in a certain order. Every element can lead to improvement in business performance, either alone or through another element.

In addition, a majority of the previous models of the measurement of innovation capability and related concepts have not taken the cause-effect relationships into account. It is not enough to know-how many new innovative processes, actions or products have been conducted, if there is no understanding about their connection to business performance. In Epstein's (2007) model, the cause-effect relationships have been acknowledged, but the focus is not merely on innovation capability. The model discusses the inputs, processes and outputs of innovation, but does not take account of the variety of elements of innovation capability. Thus, the framework presented in the paper goes one step further than the previous models by discussing both the cause-effect relationships and the innovation capability view and its effects on business performance. Although many studies have confirmed a positive relationship between

innovations, innovativeness and business performance, the current literature lacks a comprehensive framework for the measurement of innovation capability and its effects. The current literature also lacks procedures linking the development of innovation capability to the measures of business performance.

Traditionally, for example the balanced scorecard has contained innovation measures only in the personnel perspective. However, this viewpoint does not comprehensively cover the measurement of other innovative outputs, for example related to customers, internal processes, and finances. As the balanced scorecard is the most commonly used performance measurement system, the measurement of innovation capability has been connected to the four perspectives of it in the framework presented in this study. The main purpose of the framework is to show that the development of innovation capability should appear in all four business performance perspectives.

The other contribution of the paper is the definition of the concept of innovation capability, which has so far not been unambiguously defined. Based on the matching of earlier literature, innovation capability has been divided into three elements: innovation potential, innovation processes and the results of innovation activities. Innovation potential can be considered to have five categories, namely leadership and decision-making processes, organizational structures and communication, collaboration and external links, organizational culture and climate, and individual creativity and know-how. This study suggests that organizations which exploit these aspects effectively in their innovation processes are expected to have successful results of innovation activities, which will have an effect on the organization's overall performance in the long run. As an implication, the framework offers groundwork for assisting both academics and practitioners to understand the essence of innovation capability and how innovation capability can be linked to the business objectives.

The conceptual framework for the measurement of innovation capability and its effects is based on a literature review and the considerations of the researchers. In the future, the framework can be tested before decisions about its suitability can be made. The framework will be tested in a Finnish forest industry organization, but the data has not been collected yet. For further research, more case studies are needed to evaluate the suitability of the framework. For example, a scale for measuring innovation capability can be developed. The scale can be tested with empirical evidence, and it makes it possible to determine where a specific firm is located on that scale.

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